AVIATION

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Action picture of a Whirlwind powered tapered wing Waco.

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NUMBER 10

Special Features

Tractors in Airport Building

1928 Airplane and Engine Production

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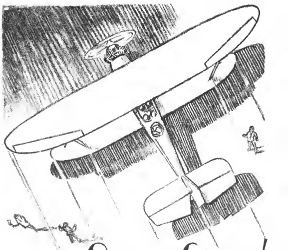

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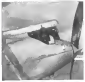

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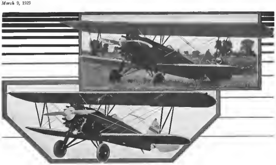

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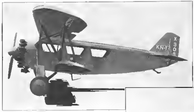

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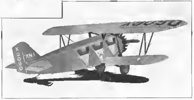

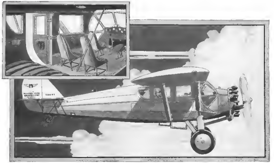

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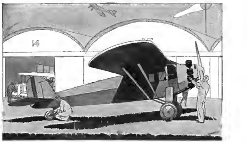

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Changing Terminology

THE N A C form of accident report which was illustrated in our issue of February 16 uses as one of the classifications of the causes of accidents the term tail spin It is pointed out by one of our correspondents that it would have been better to have used the word stall He points out that every tail spin is really the result of a stall and that this would have been the better word to use

As a matter of fact it is our belief that tail spins, with well designed commercial planes, are not such frequent causes of accidents as to deserve a separate classification Many commercial planes cannot be spun except by an expert pilot using all his power and full controls, and most commercial planes will come out of a spin immediately after the controls are put in a neutral position Therefore accidents due to spinning with commercial planes will be rare With military planes the spin probably will long remain a source of danger

With the improvement in the design of planes, however, a distinction will have to be made between stalling and what is commonly called squashing" Stalling in old types of planes inevitably resulted in a spin In a modern design a real stall results in the plane pitching forward and remaining nose pointed at the ground until it has regained sufficient flying speed to make the controls effective If the ground gets in the way too soon there is a crack up Planes are being developed, however so that they will not point their noses at the ground unless the controls are used very violently, and the plane is put in a position where it must either whip nose down or slip backward. These planes will settle on an even keel and with effective control even though they have gone far beyond the stalling point If the ground meets them while they are still settling a crack up results which though largely absorbed by the undercarriage may pretty completely wash out the plane The advance in the design of planes evidently necessitates the use of a new terminology, and some better word than "squashing" should be developed for the ability or disability of settling rapidly while on an even keel

A Double Lesson

IT WAS to be expected that Lindbergh would fly again as soon as possible after his recent accident with Miss Morrow at Mexico City. Not only was the action characteristic of his sporting spirit but it was also perfectly good psychology Long years ago it was found that it was best to remount a horse after being thrown and the same applies to a plane

The other lesson is that more attention should be paid to wheels and landing gears Wheels come off as frequently as wheels and tires used to come off the early automobiles The writer has seen one come off and has also been up in a plane when one came off and he can assure his readers that it is a most unpleasant sensation to be flying around knowing that the pilot must land on one wheel Ultimately a substitute probably will be adopted for wheels as far as airplanes are concerned, but in the meantime mechanics and others should examine them carefully from time to time and make sure that everything is as it should be

Blind Flying Instruction

FLYING blind through fog and cloud by day and by night has developed in this country from the operations of the air mail, and there is no doubt that more of it has and is being done in this country than in any other part of the world American mail pilots taught themselves to fly by instruments not because they wanted to, but because they had to, and the development of the instruments and the use of them developed simultaneously As a result of not having proper instruments when they learned originally, really old-time pilots, with the exception of mail pilots, distrust their instruments There are many very experienced pilots who even today cannot fly blind even with the best of instruments They and many others consider flying blind as an art which can only be learned by long experience and by much flying under weather conditions that the experienced pilot of mature years is not willing to risk.

To a certain extent this is true, but on the other hand the proper use of instruments can be demonstrated and even practiced without danger Any one who has taken the tests with the Ocker Meyer devices will realize that his senses are not to be trusted as much as are the instruments In the better schools of advance piloting in Europe there are dual control machines with a hood arranged over the student's head so that he can see nothing but his instruments The student is thus forced to fly by instrument, yet at the same time there is no danger as the instructor can check mistakes. Even take-offs are practiced with the pilot under a hood. It often takes an experienced pilot almost as long to fly by instrument with comfort and precision as it does for a novice to learn to fly at all

This hooded flying does not of course, make an experienced blind flier any more than painting lessons make an artist, but it does help. It would seem as if there might be much value both to fliers and to a school in going further into the art of flying in thick and murky weather. Many pilots, of course, practice by flying through clouds when there is a reasonable ceiling between the clouds and the earth, but this may be dangerous and is not to be recommended when carrying passengers

1928 Airplane *and* Engine Production

By R Sidney Bowen, Jr

In order to conduct a 1928 airplane and engine survey, which, believe it or not, has resulted in a 100 per cent return of questionnaires and can be taken as being 95 per cent correct, it was necessary to submit to the request of several manufacturers and keep faith with them in the matter of refraining from publishing the production figures together with the name of each individual manufacturer. Therefore, names will be omitted and we will deal exclusively with totals and percentages of various types of planes and engines for the country as a whole and also for different groups of states according to geographical location Before carrying on with this

Front quarter view of a Velie powered Monocoupe

discourse on "facts and figures" the writer would like to express his appreciation and thanks for the splendid cooperation of the manufacturers, and the hope that, should they peruse this somewhat detailed report of last year's production, they will consider that we have "kept the faith," and perhaps derive from it sufficient information of value as to make them willing to extend a similar amount of cooperation next year.

And so to the task at hand.

Commercial airplane production for 1928 was almost 300 per cent greater than commercial production for 1927. To be exact there were 3885 commercial planes produced in 1928 as against 1374 commercial planes manufactured in 1927. On the other hand, however, the gain of 1928 military production over 1927 military production was less than 100 per cent. In 1927 there were 621 military planes produced and in 1928 the total was increased to 1094. Thus, the grand total of all types produced in 1927 was 1995 and the grand total for 1928 was 4979, or an increase of slightly over 225 per cent

Engine production figures must be confined to 1928 alone, for, insofar as we have been able to find out, there are no exact figures on 1927 commercial and military engine production In 1928, however, there were 2,526 commercial engines built, including about 100 rebuilt engines, and 2050 military engines built, including 600 rebuilt jobs. That makes the grand total of 4576 engines, or almost one engine for every airplane A point of interest to be noted here is that there were about one and one half commercial airplanes built in 1928 for every commercial engine, whereas there were almost two military engines built in 1928 for every military plane Engine production percentages figure out to be commercial engines 55 per cent, and military engines 45 per cent.

By classifying engine production according to horsepower we get the following production figures for 1928.

50 hp	*50-150 hp.*	*150 250 hp*	*Over 250 hp*	*Military*
157	1,033	858	478	2 050

It will be noted that the greatest number of commercial engines produced in 1928 were in the 50-150 hp. class Of that number, which represents about 40 per cent. of the entire commercial production, at least 70 per cent. were engines designed for the replacing of the famous of OX5 Another item of interest is, that of 25 companies manufacturing commercial engines, four companies produced 75 per cent of the total production There were five military engine manufacturers producing in 1928 and of that number one produced 36 per cent. With regard to commercial and military engine production according to states, it is worthy of mention that of 10 states in which commercial engines were manufactured, two states

A Wright "Whirlwind" engined Waco 10

(Connecticut and New Jersey) produced 56 per cent. And in five states where military engines were made, two states (Illinois and New Jersey) produced 66 per cent of the total.

To go back to airplane production, it has not been mentioned as yet that of the total number of planes, both military and commercial, 78 per cent, were commercial craft and the remaining 22 per cent military craft

Left Side view of a Consolidated traing plane Right: An OX5 powered Curtiss "Robin"

As there has been considerable discussion pro and con as to whether or not the trend of modern airplane design is toward the monoplane, perhaps the following may be of more than a little interest

In 1928 there were 2704 biplanes constructed, 1143 monoplanes, and 38 water craft, which includes 30 amphibians and 8 flyingboats Figuring the percentages we get 696 for the biplanes 295 for the monoplanes and 009 for the water craft Thus it will be noted that there were over two biplanes made for every monoplane By classifying the biplanes and monoplanes according to type we get the following 1928 production figures

Single engine open biplanes	*Single engine cabin biplanes*	*Twin engine biplanes*	*Three engine biplanes*	*Single engine open monos*	*Single engine cabin monos*	*Twin engine monos*	*Three engine monos*
2,651	47	1	5	105	967	3	68

As the above table shows the leading type of plane from a production standpoint was the single engined open, biplane The next in line was the single engined cabin monoplane, and the next the single engined open mono plane Bringing the well-known and much used percentages into play again we find that 69 per cent of the total commercial production was claimed by the single engined open biplane, and that 25 per cent of the total commercial production was made up of single engined cabin monoplanes Thus it will be seen that for each plane of the leading monoplane type manufactured there were almost three planes of the leading biplane type manufactured Whatever that proves, if anything, is left to the opinion of the reader But before forming any opinion regarding type sales possibilities, etc, we suggest that the question of price be given due consideration

One item regarding the manufacture of aircraft that has brought forth comment from the airminded and unairminded alike, is the number of manufactutrers listed as being engaged in the art of producing airplanes Our own files list some 183 companies However, only 109 of these actually produced one or more planes in 1928 That figure of 109 does not of course include the various mergers that took place last year Each subsidiary company has been regarded as a separate manufacturing organization

The point of interest, though, is that although the number of actual producing companies is only 109, eleven of them produced 76 per cent of the entire commercial production for the year There were but nine companies that produced military planes in 1928 and of that number two companies produced 48 per cent of the military planes made

Two States Produce 42 Per Cent

As regards commercial and military production by states, it is of interest to note that of the 25 states in which commercial airplanes were manufactured, two states (Kansas and Ohio) produced 42 per cent. And that in five states where military planes were produced, one state (New York) produced 63 per cent. of the total number of military planes

Production figures and percentages for the various types of aircraft and engines according to the geographical location of the manufacturers may prove interesting for all those who may desire a "bird's eye" view of the United States. Therefore we have endeavored to compile the following information

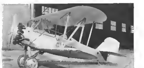
First it is necessary for us to designate the various states that are included under each territory grouping.

The New England Group consists of Maine, Vermont, New Hampshire, Massachusetts, Connecticut and Rhode Island

The Middle Atlantic Group consists of New York, New Jersey Pennsylvania, Maryland, Delaware and District of Columbia

The South Atlantic Group consists of Virginia, West Virginia, Kentucky, Tennessee, North and South Carolina George, Alamaba, Mississippi, and Florida.

The Middle Western Group consists of Ohio, Indiana, Illinois Michigan, and Wisconsin



Left A Travel Air biplane fitted with a Warner "Scarab" Right A "Wasp" powered Vought "Corsair"

The South Western Group consists of Louisiana, Arkansas, Oklahoma, Texas, New Mexico and Arizona

The Central Northwestern Group consists of Minnesota, Iowa, Missouri, Kansas, Nebraska, North and South Dakota, Colorado, Wyoming and Montana

And the Pacific Coast Group consists of California Nevada, Utah, Idaho, Oregon and Washington

Taking biplane production figures we have the following

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
4	315	1	810	112	1,518	44
or	or	or		or	or	or
0032%	08%	0008%	30%	04%	56%	.016%

As will be noted from the above table the Central North Western Group is far in the lead in the total number of biplanes produced Without revealing any state secret we might make mention of the fact that Colorado and Kansas were largely responsible for that figure of 1518 planes

The monoplane figures may prove to be equally interesting, and are as follows

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
0	254	20	459	2	329	79
	or	or	or	or	or	or
	22%	019%	40%	001%	29%	07%

New England was not in the running as regards the production of monoplanes and the blue ribbon went to

An OX5 powered American Eagle biplane

the Middle Western Group The states of Illinois, Michigan and Missouri played a most active part in making a total figure of 459 for that group

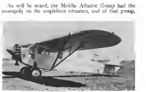
The flying boat figures prove to be few and far between, geographically speaking They are as follows

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
0	2	0	0	0	0	6
	or					or
	25%					75%

The same remarks are true for the amphibian figures which are as follows

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
0	29	0	1	0	0	8
	or		or			
	97%		03%			

As will be noted, the Middle Atlantic Group had the monopoly on the amphibian situation, and of that group,



A Fairchild monoplane fitted with a "Whirlwind"

New York and New Jersey played the two leading parts.

Figuring totals of all types of commercial planes according to the various groups of states we find the following

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
4	500	21	1 270	114	1,847	128
or	or	or	or	or	or	or
003%	13%	.005%	324%	03%	47%	030%

By virtue of the fact that the Central North Western Group produced such a quantity of biplanes, it of course takes the lead in all type totals, with the Middle Western Group an easy second

Military production figures by state groups are confined to two groups as follows:

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
0	868	0	0	0	0	226
	or					or
	79%					21%

Of the blue ribbon winning Middle Atlantic Group, New York was by far the most productive state.

And for the grand totals of both commercial and military planes we find that the Central North Western Group still holds the lead, (with the most decided help of Colorado and Kansas) regardless of the fact that not a

A W A.E. Fokker F10 powered with three Pratt & Whitney "Wasp" engines

A "Wasp" engined Loening Cabin Amphibian

single military plane was reported as having been manufactured in that territory. The results are as follows:

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
4	1,368	21	1,270	114	1 847	355
or	or	or	or	or	or	or
001%	.276%	003%	.255%	022%	37%	071%

Although commercial and military plane production honors went to parts west of the Mississippi River, commercial and military engine production honors stayed very much east of the big stream of water. Of the

A "Whirlwind powered Buhl "Airsedan"

three groups that figured prominently in the commercial production, two of them border on the Atlantic Ocean. The totals and percentages are as follows

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
461	816	1	686	70	0	382
or	or	or	or	or		or
18%	.36%	003%	27%	.02%		168%

It will of course be readily surmised that New Jersey figured most conspicuously in the leading Middle Atlantic Group, and also that Connecticut played an equally important part in the New England group, and that Illinois lead the Middle Western Group

Military production figures by groups of states are somewhat a repetition of the commercial figures, with the exception that the South Atlantic, South Western and Pacific Coast groups joined the Central North Western Group by not being in the running at all The figures for the entire lot of groups are as follows

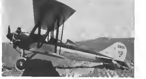
New England	Middle Atlantic	South Atlantic	Middle Western	Pacific Coast	Central N West	South Western
510	889	0	851	0	0	0
or	or		or			
25%	43%		33%			

Here again the states of New Jersey, Connecticut and Illinois played the important parts in their respective groups

Honors for both military and commercial engine production, by groups of states, are of course the same, as shown in the following grand totals

New England	Middle Atlantic	South Atlantic	Middle Western	South Western	Central N West	Pacific Coast
971	1 805	1	1,337	70	0	392
or	or	or	or	or		or
212%	.394%	.001%	.283%	015%		.085%

Whenever a group of members of the aeronautic industry get together it is almost an odds-on bet that the merits of the East vs the West, as regards things aeronautical, will hold the attention of all for the time being



Side view of an Alexander Eaglerock

Therefore, if commercial and military plane and engine production can be included at such times, perhaps the following figures will help to strengthen some one's assertions

In this particular table the Mississippi River has been taken as the dividing line

	Biplanes	Monos	Amph.	Fl boats	Mil Planes	Com Eng	Mil. Eng
East	1,370	733	30	2	888	2 064	2 059
West	1 334	410	0	6	226	462	0
Total	2,704	1 143	30	8	1,094	2,526	2,050

In conclusion we might state, that from the standpoint of production of both commercial and military airplanes and engines, the year of 1928 was most gratifying Particularly because of the fact that commercial production was increased to such an extent, and also because of the fact that replacements for the war surplus engines were produced in such increasing quantities What increase will be made in 1929 is a subject which creates more than a little discussion Present estimates that one hears range

An Ireland amphibian fitted with a Whirlwind

from 8000 to 15,000 commercial planes, and corresponding estimates for military plane and commercial and military engine production We would like to go on record as estimating a production increase for 1929 of about 60 per cent over 1928

Research Laboratory *at* Stanford University

By Andrew R. Boone

THE aerodynamic laboratory of Stanford University, California, was installed during the winter of 1916-17 with the immediate purpose in view of providing equipment for the carrying on of an extended investigation on air propellers, the first stage of which was planned for 1917 With funds provided by the National Advisory Committee for Aeronautics, a wind tunnel was built in one of the existing buildings A propeller dynamometer was constructed and an experimental research on 51 model airplane propellers was carried to completion. That was the first systematic investigation of the characteristics of air propellers conducted in this country and the most extensive single cesearch ever undertaken in this field

Since that time other researches have been undertaken and the laboratory now is engaged in a program of experimental research. This program, which follows, may be of interest before the laboratory and its equipment are considered:

1—An experimental investigation of the performance characteristics of a series of five metal model propellers in a free air stream and in combination with a model VE-7 airplane.

2—An experimental investigation of air propellers in yaw It is planned to conduct this investigation in a series of United States Navy standard models at angles from zero to 20 deg

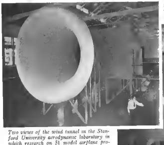
3—An experimental investigation of the rotational velocity of the slip of air propellers. It is planned first to determine the rotation in the slipstream of a series of U. S. Navy standard model propellers and then to investigate the effect of straightening vanes upon the power absorbed and efficiency

4—An experimental and theoretical investigation of the causes of discontinuous airflow It is desired to formulate criteria which will enable the prediction of the departure of smooth flow from the surface of an airfoil or streamline body.

5—An experimental investigation of the induced drag of high aspect ratio airfoils It is intended to test airfoils having aspect ratios from six to 15 and to compare the results with the predictions of the Lanchester-Prandtl theory.

6—An experimental investigation of the profile drag of certain airfoils A special form of airfoil has been devised by which it is believed the profile drag may be measured directly with a balance An airfoil will be tested at a number of angles of attack to determine if experimental evidence supports the theory evolved

The present wind tunnel, like the first, is of the Eiffel type Except for detailed specifications, it generally resembles the first This type consists essentially of three elements collector, diffuser and experiment chamber At the end of the



Two views of the wind tunnel in the Stanford University aerodynamic laboratory in which research on 51 model airplane propellers was carried to completion.

diffuser is located an exhaust fan which draws the air through the diffuser and delivers it to the room in which the tunnel is located

This draft of air from the diffuser may be viewed as producing a reduced pressure in the experiment room, which is practically air-tight otherwise except for the entrance through the collector In answer to the depression (difference of pressure between the experiment room and that in the surrounding room on the outside), the air flows as through a nozzle, in through a collector, across the experiment room to the inner mouth of the diffuser, and thence on to the fan The column of air thus flowing through the experiment room is then available for aerodynamic investigation

The cross section was taken circular and the diameter of the throat of the present tunnel is 8 ft Aside from structural details, the chief problem in the design of the wind tunnel related to the forms of the collector and the diffuser.

At the end of the diffuser and just before reaching the propeller exhaust fan, the form of the diffuser in slightly modified by bringing the curve of cross section areas in slightly so that the areas are sensibly uniform just before reaching the fan location at the exit end of the diffuser In order to secure uniformity in flow at the entrance into the mouth of the collector, a honeycomb structure was built in the delivery end composed of hexagonal cells. These are of builders roofing tin, soldered at the edges to form a stiff and true structure with thin walls and presenting minimum resistance to the flow of air. In order to collect the air at the entrance end of the diffuser, an inward projecting flaring rim was fitted.

The exhaust fan at the outer end of the diffuser is of the propeller type. The propeller fan is driven through a belt connection from a motor Such changes in air speed as are desired in the program of propeller tests are obtained by changes in the size of the drive pulley on the motor shaft The air speed for any given run of tests contemplates sensibly constant air speed for any given run of tests and variable revolutions of the test propeller. This permits a constant motor speed for the fan propeller with variations in slip and other conditions secured by varying the revolutions of the model propeller

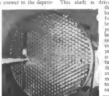
No attempt will be made to give full structural details of the equipment These must in any case be determined largely by special circumstances It is interesting to note, however, that the room was made practically airtight The photographs accompanying this article indicate the nature of the pertinent apparatus For entry and exit from the room an airlock is provided with doors closing on suitable packing strips and fitted with self-adjusting hinges, allowing close contact between door and packing With this general character of construction the experiment room was readily made substantially airtight and of a strength sufficient to carry the load due to the excess pressure of the outer air above that maintained in the chamber.

The special equipment for propeller testing comprises the following items:

1—Thrust dynamometer. 2—Torque dynamometer.
3—Revolution counter. 4—Air speed meter.

With reference to the thrust dynamometer, the general form of the apparatus was so designed as to place the propeller well forward of any sensible obstruction in the path of the air stream, and even here the standard is given a sharp forward and after edge and streamline form in order to minimize any possible reaction on the propeller itself

The propeller is carried on the forward end of a shaft which runs in ring oiling, cylindrical, bronze bearings This shaft is driven without longitudinal constraint through a yoke at the rear end having hardened steel flat longitudinal surfaces which engage with small ball-bearing steel rollers on a companion yoke carried by a bevel gear This bevel gear runs on ball bearings outside the hub, which is bored to provide freedom from contact with the propeller shaft The driving motor is placed well over at the side, entirely out of the wind stream and drives the propeller shaft through bevel gearing and the yokes mentioned In this manner the propeller shaft is subjected to angular compulsion only insofar as the motor drive is concerned It is



Top: The honeycomb baffle used in the Stanford University wind tunnel.

Center Counter designed by Prof. E P Lesley for measuring exact speed of test propellers.

Bottom The instrument used to measure propeller torque.

entirely free to move longitudinally, as may be determined by other forces

These other forces are the thrust due to the propeller itself and some form of weighing or measuring device calculated to control and balance such thrust. To this end the propeller shaft is furnished with two ball-bearing thrusts which connect through hardened steel knife edges with a vertical lever. This lever is attached to a shaft which extends outside the standard, well beyond the air stream where it carries a horizontal scale beam with suitable weights

An adjusting weight in the casting serves to adjust the center of gravity of the device for sensitiveness of movement, and suitable stops control the range of travel of the vertical arm, and hence the horizontal travel of the propeller shaft

This arrangement furnishes a sensitive and reliable

means of measuring longitudinal forces developed by the propeller and without constraint due to the motor drive The frictional forces involved when the shaft is in rotation are so small as to be negligible in comparison with the propeller forces involved, but even these, small as they are, may readily be eliminated by suitable calibration

The torque on the motor shaft is then measured by the torsion of a special coiled spring To measure this torsion two fibre disks are fitted to the shaft, one on either side of the spring These disks carry a narrow metal strip on the edge to serve as an electric contact The contacts are electrically connected to the shaft and hence to each other A fixed brush resting on the face of the disk "A" is carried by the dynamometer frame From this brush is led an electric conductor, first to a battery, then to a telephone receiver, and then to a second brush mounted over disk "B" If the contacts on the disks pass under the brushes simultaneously the circuits will be closed for the instant and a click will be heard in the telephone receiver If they do not pass simultaneously, the circuit will not be closed and no click heard Suppose, then, with no torque on the shaft, the brush carrier at "B" is so adjusted as to give simultaneous contacts and a click in the receiver is heard, then with a load thrown on and a resultant torque the spring will twist, the contacts no longer will be simultaneous and no click will be heard Then the brush holder at "B" can be moved around to a point where the contacts again will be simultaneous and the click will be picked up again The angle, through which the moveable brush holder is carried in order thus to compensate for the twist in the drive spring will measure the angle or torsion and thus by suitable calibration is readily translated into torque moment

Propeller revolutions are counted by the movement on a drum, geared down by double worm-gear drive and so adjusted in diameter that one inch of travel on the face of a paper strip carried on the drum is just 50 revolutions The drum is appropriately mounted on a frame with pencil carrier and with electric connection to a second's beating pendulum In operation the drum revolves and the pencil (or pen) resting on the paper draws a line with jogs introduced by the clock at second intervals A given length of time is thus translated into revolutions per minute thus readily determined

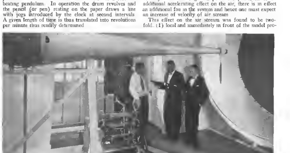
The ultimate measure of air speed is based on the Pitot tube In the type used the static pressure is indicated through air holes of about 0.02 in. diameter To avoid making a series of Pitot tube readings in connection with each experiment, however, a series of determinations were made between the depression (difference in pressure outside and within the experimenting room), considered as an air pressure head, and the resulting velocity at the propeller location within the experiment room

Concerning wind tunels in general, no matter what the type, the air circuit may be considered as closed If the circuit is complete and such as to hold the air under restraint throughout the entire round, the closed character is evident. If, as in the Eiffel type, the air is delivered to one end of a room and drawn from the other, the return outside the tunnel may be viewed as through the room The room may furthermore be considered as of any size, and in the extreme case it may be supposed infinite in dimension in which case the air may be considered as delivered at one point and drawn in from another

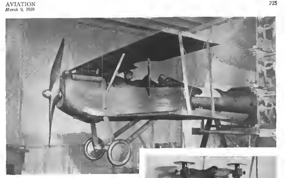
From this viewpoint, the problem is, therefore, that of establishing and maintaining a continuous flow of air in a closed circuit The energy required will then be obviously the energy dissipated in the circuit If no energy were so dissipated the air circuit once set up would continue indefinitely There is, however, a continual dissipation of energy in the form of turbulence due to surface resistance and unavoidable formation of eddies and turbulent motion This loss the fan or its equivalent must supply

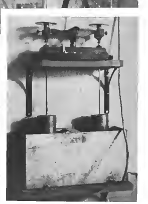
The relation between the depression within the experiment room and the velocity of the air stream was based on Pitot tube determinations of velocity and manometric balance measures of the difference of pressure acting as an air head Numerous determinations of this relation were made at the start of the work. Also, it should be noted that when a model propeller is in operation with a velocity sufficient to give a positive slip and hence an additional accelerating effect on the air, there is in effect an additional fan in the system and hence one must expect an increase of velocity of air stream

This effect on the air stream was found to be twofold. (1) local and immediately in front of the model pro-



Professor Lesley and two colleagues standing near the control panel of the wind tunnel





Top A model mounted in the Stanford University wind tunnel. Botton The device used to measure the velocity of the air stream by comparison of atmospheric pressure within and without the tunnel The cells float in coal oil and weigh less than 0.01 lb per sq ft

peller, where there will be acceleration of the air as it approaches the propeller and (2) outside the immediate local influence of the model propeller where there will be an increase in air stream velocity due to the greater amount of energy supplied in the circuit and a corresponding reduction in pressure in the experiment room with consequent general increase in the speed of inflow It was, therefore, important to ascertain whether the general velocity of air stream, as indicated by that of the cylindrical shell about the propeller, still remained in the same relation to the fall of pressure within the experiment room

Careful and repeated tests showed that this was the case and it was, therefore, assumed that the combined action of the large fan propeller and the model propeller was to produce a velocity of air stream in the cylindrical shell surrounding the model, standing in the given and fixed relation to the depression caused in the room by the joint action of the two propellers The velocity of air stream then corresponds to the indefinite stream flowing around and outside the propeller in the case of an airplane in free flight, and is, therefore, taken as corresponding to the velocity of flight through the air

Similarly the local result immediately in front of the model propeller is to be taken as similar to the local acceleration of the air immediately in front of the airplane propeller, causing a local flow of air aft to meet the forward moving propeller

With a model propeller in operation and throwing aft a slipstream of pronounced velocity, the air stream across the entire section forward of and about the propeller was subjected to survey by Pitot tube The results indicated a relatively abrupt break in the influence of the propeller close about the tips of the blades, and that the size of the slipstream proper at and just in advance of the propeller was practically determined by the diameter swept by the tips of the blades The velocities in the cylindrical ring lying outside the blade tips were also compared with the depression within the chamber and found to agree as previously stated These tests indicated that the special influence of the propeller in disturbing the distribution of velocites through the air stream extends to but a slight distance beyond the circle swept by the tips of the blades The indications of this test, therefore, support fully the anticipated relations between diameter of propeller and of air stream

Tractors *in* Airport Building

WITH the growing volume of traffic and the ever increasing size of passenger carrying planes, the building and maintenance of airports is becoming more and more important. Not only must the runways be kept in perfect condition, but the entire field should be firm and level to permit safe landings and take-offs anywhere This is true of emergency landing areas, as well as all other fields.

Constant care is necessary to maintain any level area of ground Usage, frost, rains and the normal settling of the earth will cause depressions to appear An uncoated dirt surface probably is affected to the greatest extent, and perhaps one of the most striking examples of this is a dirt road, which is not graded frequently enough However, an oiled, a cinder or a sodded area also require attention Realizing this, the operators of some of the larger airports throughout the country are constantly grading and rolling their fields in an effort to provide as smooth a surface as possible, and in this work, the tractor seems to have come to the fore as one of the most adaptable pieces of machinery for furnishing power.

Taking examples from the road builders, the tractor first apeared upon the scene when engineers adapted agricultural, road building and contracting tools to airport construction as a means of cutting costs and speeding the work. In two outstanding instances, the construction of the Newark Metropolitan Airport at Newark, N J, and that of Oakland Municipal Airport at Oakland, Calif, tract-type tractors, because of the ability to operate in soft ground or mud, furnished the motive power for these devices almost entirely The sites of both fields were formerly nothing but tracts of marshland

At Newark, the work of reclaiming the swamp lands to the east of the city had bern going on for a number of years However, there was still much to be done when the city engineers began the construction of the airport, for the site was covered with an earth and ash fill The filling of the depressions, installing a drainage system, placing two creeks underground and the building of roads and bridges was a tremendous undertaking But in less than seven months, the first unit, consisting of about one-half of the 600 acre field, was opened. In this work the tractor played a large part

"Caterpillar' tractors at work Top: Building the Nowark Airport Center: Levelling the runway at Oakland Municipal Airport Bottom: Hauling drainage tile at Oakland after trucks had bogged down

Much of the preliminary filling of the low lands was accomplished by bydraulic sluicing, and it was on this soft footing that four tractors equipped with "bulldozers" went to work, smoothing the hydraulic fill. Then, large quantities of dry fill were brought in by automobile truck and were spread out evenly by the tractors The tractor was the only logical thing to use there, be-

cause the geound was extremely soft and uneven. The trucks in bringing in the dry fill often became mired and had to be pulled out by the tractors In constructing the drainage and sewer system, the tractors also proved invaluable for use in backfilling the trenches, and the roads were constructed with their aid

The same thing was true in the construction of the Oakland airport When the work was started, the site was nothing but a swamp. Horses could scarcely work at all, and the use of trucks was impossible until the tractors had provided a more firm footing. Two tractors were employed at first, and then four These machines, pushing bulldozers and afterward was spred and levelled with a special road-mounds off into the depressions The land was plowed, and afterward was spred and levelle with a special road-building grader After that it was rolled by the tractors. In addition, these machines were used for hauling supplies, backfilling trenches, erecting signal towers, and for stretching wire and cable

In the building of other airports, too, the tractor has played a large part. At the Springfield-Agawam field, which is located about five miles west of the center of Springfield, Mass., tractors were used for pulling down trees, uprooting stumps and unseating boulders, as well as for levelling and rolling the land and other work in connection with the transformation of a tobacco plantation into an airport In Detroit, Mich, tractors and trucks were used for changing a garbage dump into an aviation field in much the same manner that they were used at Newark; and at Chicago, Ill, tractors hauled, rolled and spread cinders after accomplishing the preliminary construction work

At these airports and others, the tractors are still in service and are used constantly in maintaining smooth surfaces on the runways and other portions of the field In fact, tractors are now an article of standard equipment at many ports In many cases, cities that are operating aviation fields have purchased and assigned tractors for permanent use in the upkeep of their fields, so great is the importance of the tractor in the maintenance of an airport regarded. In this connection, it might be mentioned that large "Caterpillar" tractors are one of the most popular makes for use in airport work

Aside from the actual construction and maintenance work, however, the tractor is finding many applications at the modern air terminal It is recognized that a plane on the ground is unwieldly at its best. With the engines running, it is possible to taxi a plane into position, but the radius in turning is large and a "burst of gun" is necessary This is often highly undesirable when there are spectators and passengers nearby, and at many airports small tractors are now used to move the planes about

Above Moving dirt with the use of tractors and "crawler" wagons in the construction of a North Carolina airport Left A tractor filling in a low spot in building the Detroit Municipal Airport.

For this work also, the track-type tractor seems to be the most popular, because of its splendid traction on almost any surface and its remarkable power. At the Oakland Municipal Airport, a small Caterpillar "10" is used regularly for moving the large transport planes. The plane is towed by the tractor by means of a line attached to the landing gear, while steering is accomplished by means of a small "dolly" placed under the tail skid. By this system, it is possible to jockey a plane into any desired position It is also proving valuable for moving planes about inside the hangars and for closing the large hangar doors

A "Caterpillar 10" towing a Western Air Express three engined Fokker transport at Oakland Municipal Airport.

Caterpillar tractors also are providing the motive power for operating snow plows during the winter months at a number of airports in the northern section of the country. The traction of this type of tractor again is invaluable, and, in many instances, airport officials have reported that they have been able to keep ahead of a drifting blizzard with a snow plow attached to tractor, so that it has been possible to resume service immediately after the storm Another use of the tractor has been developed likewise with the mounting of moveable floodlights on them.

Cross-License Agreement of Dec. 31, 1928

By Joseph I. McMullen
Lieutenant-Colonel, Judge Advocate General's Department in charge of War Department Patents

AFTER nearly 10 yr of effort owners of aircraft patents have revised and renewed the cross-license agreement, first made during the World War.

With the close of the war period and the resulting curtailment in the manufacture of aircraft except for certain limited orders by a few government departments, the real necessity for the agreement practically ceased. The years following the War until the impetus given aviation by Lindbergh's successful flight, were lean years for plane manufacturers. Indeed, many of the corporations engaged in building aircraft went through bankruptcy, but while there still remained a necessity for a cross-license agreement there was not that urge that became so apparent immediately following Lindbergh's flight.

From the successful flight of the Wright Brothers, and the issuance to them of Patent No. 821,393 on May 22, 1906, development of airplanes and the art of flying was rapid. By the end of 1916 considerable progress had been made in this country and much more in Europe. A few other patents had been issued. Notable among these patents were those to Bell, et al, No. 1,011,016, issued Dec. 8, 1911, and Christman, No. 1,095,548, issued May 5, 1914. In two suits, Wright Company vs Herring Curtiss Company, 211 Fed., 354 and 204 Fed. 597, the court held that the Wright patent was the pioneer and was infringed by the Bell patent. This, of course, is not to be taken to mean that the Bell patent was invalid.

In 1916 the Wright Martin Co., owner of the Wright basic patent, notified peospective manufacturers of airplanes of the existence of patent No. 821,393, and suggested contracts for royalties for its use, which were prohibitive, but clearly within the patent monopoly.

In January, 1917, both the War and Navy Departments, anticipating our entry into the war then in progress in Europe, and the consequent use of a large number of planes, informed the National Advisory Committee for Aeronautics of the situation and requested that the matter be looked into with a view of determining a solution of the situation in the then state of the law (Act of June 25, 1910). The Patent Committee of the Committee for Aeronautics made a careful study of the situation and determined that, in view of the fact that considerable litigation was probable to determine the prospective rights of the patentees, necessarily resulting in the embarrassment of the Army and Navy in carrying out their plans for national defense, some form of inter-licensing would help the situation. It must be remembered that at this time the Act of July 1, 1918, was not in existence, and there was serious doubt whether the Act of June 25, 1910 supra, destroyed the right of injunction by a patentee against a contractor for the Government. Through the efforts of the National Advisory Committee for Aeronautics the principal patentees of airplane inventions consented to cross-license each other. For this purpose the Manufacturers' Aircraft Association was established and the so-called cross-license agreement of July 24, 1917, executed.

The first cross-license agreement shows that the Manufacturers' Aircraft Association, Inc., entered into a contract, July 24, 1917, with various persons, firms and corporations, called subscribers, who became stockholders. The contract recites that the several parties were interested in the manufacture, sale and use of airplanes, and desirous of promoting the industry and advancement of the art. It was recognized that the development and advancement in the industry had been retarded by reason of the existence of certain United States patents, claimed as basic, upon which suits had been brought or threatened for infringement, royalties and damages, and that it was desirable to prevent and avoid litigation and give to all subscribers the right to make, use and sell airplanes embodying the inventions of each.

As a result of this cross-license agreement the holders of patents relating to aircraft, pooled their patent interests on a fixed royalty of $200 to be paid into an association and distributed in accordance with the proportionate contributory value to the industry. Subsequent to this arrangement, on April 19, 1918, the agreement was changed and the royalty rate fixed at $100 for each plane.

Conditions since the close of the war, without a real live and effective cross-license agreement, have not been satisfactory either to the Government or to the Association. But now, together with the rising commercial interests, the necessity for an effective agreement to promote and develop the industry and encourage invention in the field of aeronautics makes the new agreement important.

The cross-license agreement, which has now been made by those foremost in the industry and which became effective as of Dec. 31, 1928, has met with the approval of the War and Navy Departments of the Government. This is best evidenced by the fact that a contract was concluded by these two Departments with the Manufacturers' Aircraft Association which went into effect as of even date with the revised cross-license agreement.

This new agreement provides for a reduction of the royalty to be paid by the subscribers of the Association to as low as $25.00 per plane. It will be appreciated that in fixing this rate a radical departure was made from the figure adopted in the original agreement and is a very material reduction from even the war time rate. In fixing the royalty at a lower figure, manufacturers are thus encouraged to meet the growing demand for small planes.

Twenty-five dollars per plane is, of course, a minimum royalty, the rates being arranged in a graduating scale according to the proportionate value of the plane—the

—maximum royalty allowed being not more than $200.

The primary functions of the Association are to act as an agent for the parties to the cross-license agreement in executing prescribed licenses, collecting and distributing royalties, and appointing through its board of directors one of the arbitrators to pass upon the value of patents acquired subsequent to the execution of the agreement.

In the hearings before the Lampert Committee in the House of Representatives in 1924, much was said about the illegality of the cross-license agreement but the final recommendations of that Committee clearly indicated that the Association was not a combination in restraint of trade within the meaning of the Sherman Anti-Trust Law and Clayton Act.

Among the criticisms it was alleged that several separate clauses of the cross-license agreement, and that the agreement itself necessarily operates in the direction of monopolization of the production of airplanes in the United States and excludes all other persons from manufacturing them, and will operate to defeat the purpose and intent of the patent laws and to immune certain corporations from liability for infringement.

The authority for the patent statutes of the United States is contained in Article I, Section 8, Clause 8, of the Constitution which empowers Congress to promote the progres of science and useful arts by securing for a limited time to authors and inventors the exclusive right to their respective writings and discoveries.

Congress has exercised this power continuously since the first patent act of 1790 (Chap. 7, Sec. 1, 1 Stat. 109) which conferred upon the patentee the sole and exclusive right and liberty of making constructing, using and vending to others to be used, the said invention or discovery. In the patent act of 1793 (Chap. 2, Sec. 1, 1 Stat. 118) the words were the same. In that of 1836 (Chap. 357, Sec. 5, 5 Stat. 117) they were changed to the full and exclusive rights and liberty of making, using and vending to others to be used, the said invention and discovery.

The present patent statute (Act of July 8, 1870, c. 230, Sec. 22, Rev. Stat. 4884, U. S. Comp. Stat. 1916, Section 9428), provides:

> "Every patent shall . . . grant to the patentee, his heirs, or assigns, for the term of seventeen years, the exclusive right to make, use and vend the invention or discovery throughout the United States and the territories thereof referring to the specification for the particulars thereof."

The leading cases, interpreting and construing the constitution and statutes are lengthy but illuminating, and they clearly establish the high character of the monopoly granted by a patent, and indicate that such a monopoly, flowing as it does from the Constitution, is not to be lightly set aside by subsequent regulative trade statutes, and a short review of these decisions will indicate the exact nature of the franchise granted and its limits.

It may be well, however, to consider what rights are conferred upon a patentee. In the words of the Supreme Court, the source of the rights is, of course, the law and it is necessary to look for the policy of a statute, not in matters outside of it—not to circumstances of expediency and to supposed purposes not expressed by the words. The patent law is the execution of a policy having its first expression in the Constitution, and it may be supposed that all that was deemed necessary to accomplish and safeguard it must have been studied and provided for.

In other words, the language of complete monopoly has been employed, and though at first only a remedy at law was given for a violation of the right, a remedy in equity was given as early as 1819. There has been no qualification, however, of the right, except as hereinafter stated. An exception which shows the extent of the right—a right so explicitly given and so complete that it would seem to need no further explanation than the word of the statute. It has, however, received explanation in a number of cases which bring out clearly the services rendered by an inventor to the arts and sciences and to the public. These cases declare that he receives nothing from the law that he did not have before, and that the only effect of the patent is to restrain others from manufacturing and using that which he has invented. And it was further said in that case, that the inventor could have kept his discovery to himself, but to induce a disclosure of it Congress has, by its legislation, made in pursuance of the Constitution, guaranteed to him an exclusive right to it for a limited time, and the purpose of the patent is to protect him in this monopoly—not to give him a use which he did not have before but only to separate to him an exclusive use for a few years.

What effect, if any, the anti-trust acts have upon the monopoly of a valid United States patent, and the extent to which the patent monopoly can be extended, if at all, so as to effect things not included within the claims of the patent, has also been considered upon numerous occasions by the Supreme Court, and the validity of the cross-license agreement is thought to be clearly justified by the following statement of that Court:

> "But that statute clearly does not refer to that kind of a restraint of interstate commerce which may arise from reasonable and legal conditions imposed upon the assignee or licensee of a patent by the owner thereof, restricting the terms upon which the article may be used and the prices to be demanded therefore. Such a construction of the act we have no doubt was never contemplated by its framers."

Although the nature of the patent right has been frequently under consideration by the Supreme Court and contracts in connection therewith have in several instances been declared void for attempting to extend its monopoly to matters not therein contained and to require considerations in violation of the general law, as well as the anti-trust statutes, there has been no case in which it has been held that the right of the patentee to determine whether or not he shall license another has been in any way impaired, and restrictions placed upon the exercise of a license, not in connection with the sale or lease of an article embodying the patented invention, certainly may be very broad in scope.

In the new cross-license agreement on Dec. 31, 1928, the parties have recited that it is their desire to bring together the owners of aircraft patents under a lump sum royalty in order to prevent litigation or threatened litigation in the future, and to give to all the subscribers the right to manufacture, sell and use airplanes embodying the inventions of each of the subscribers and to that end to issue licenses to each other with respect to patents now owned and controlled by the subscribers and as to patents which they may acquire in the future. The cross-license agreement provides that the subscriber shall not grant licenses to others on more favorable terms than those granted under the cross-license agreement to each other and also provides for arbitration of claims and disputes and means for the release of those deserving to withdraw.

As viewed at this time it is thought that the result of this agreement on the aircraft industry and the aircraft art in general will be of relatively much more importance and far reaching in its effects toward the advancement of aeronautics than was the somewhat similar cross-license agreement in the automotive industry.

That the members of the industry need have no timidity in entering into this new agreement is thought to be well demonstrated by the attitude taken by Congress and the action of the Government in dealing with the Association and especially in view of the well settled law by the Supreme Court on such combinations.

Pittsburgh's First Air Show Begins With Large Display

At Least 26 Planes Assigned Floor Space and Many Accessory Concerns Have Booths

PITTSBURGH, PA—The First Annual Aircraft Show ever held here was scheduled to open today and will continue to March 16 The Motor Square Garden was ready for throngs of visitors with a display which includes practically every department of the aeronautical industry The show promises to have a national as well as a local touch through exhibition of a wide variety of products and the presence of outstanding persons in the industry In addition to the actual display, there will be several important meetings of aeronautical groups The attention of this district will be concentrated on aviation affairs through the proclamation of the mayor naming the forthcoming week as Aviation Week Civic clubs and other organizations will hear speakers on aviation during the period.

Well known pilots, trans Atlantic fliers and leaders in the aeronautical industry, have accepted invitations to attend. The list includes William P MacCracken, Jr, William S Brock, Edward F Schlee, George W Haldeman, Parker D Cramer, Bert Hassell, William J. Scripps and "Eddie" Stinson Others have been invited.

Exhibitors Named

The show committee states that 25 planes have been assigned space. These include

Ryan Brougham, Command Aire, Waco (two); DeHaviland Gypsy Moth Swallow Fairchild (three) Challenger Eaglerock (two), Lockheed Vega, tri-engined Ford, American Eagle Alliance Argo Lincoln Page Curtiss-Robin Travel Air Cessna Flamingo, Monocoupe, Stinson Detroiter and three gliders from the factory of Gliders, Inc., Dearborn, Mich.

A partial list of exhibitors follows Joseph Horne Co; Condon Bearing & Supply Co, Gulf Refining Co Gimbel Bros Morris Flying Service Kaufman Department Stores, Inc., Standard Steel Propeller Co Westinghouse Electric & Mfg. Co., Aerial Photographic Service, American Aviator Magazine Seman's Air Transport Co; Allegheny County Council Boy Scouts of America Waverly Oil Works Co. Pittsburgh Reflector Co., American Toy Airplane Co; Ludington Philadelphia Flying Service Inc., Stout Metal Airplane Co, Gliders, Inc. Williams & Co Alliance Aircraft Corp; Trinity Court Studios Inc., Harween Products Co Pittsburgh Auto Equipment Co. Black's Transfer & Storage Co. Aero Club of Pittsburgh, Aeronautics Branch Department of Commerce 324th Observation Squadron Aeronautical Mechanics Ass'n of America, Aircraft & Airways of America Inc; Clifford Ball Inc. Aluminum Co of America Embry Riddle Co; Pittsburgh Waco Sales Co. Pittsburgh Aviation Industries, Amorino Aircraft Corp, H H Robertson Co; Airport Development & Construction Co, Pittsburgh School of Aviation, Union Switch & Signal Co., Thompson Aeronautical Corp Schlee Brock Aircraft Corp. and Metal Aircraft Corp

Named Berliner Chairman

BALTIMORE, MD—W Frank Roberts was elected chairman of the board of directors of the Berliner Joyce Aircraft Corp at a recent meeting of the board Mr Roberts has held executive positions with the Bethlehem Steel Co. and the Standard Gas Equipment Co of this city

Navy Orders 60 Wrights

WASHINGTON, D C—Contract for 60 Wright engines and spare parts at a total cost of \$242035 01 has been placed with the Wright Aeronautical Corp by the Navy Department

Dirigible Race Planned At Cleveland Air Show

CLEVELAND, O.—The International Air races, to be held in Cleveland August 24 to September 2 will include the first dirigible race ever planned, if efforts now being made prove fruitful The race would be among participants from the Goodyear-Zeppelin Corp, the Navy base at Lakehurst, N J, and the Army dirigible base at Langley Field The various dirigible operators have been approached, but no denite announcement concerning their entering the proposed event has been made by show officials

Goodyear-Zeppelin Corp, representatives say that the company doubtless will be represented. It is probable that its entrants will include one or more of its five pony blimps, two of which have been flown for some time, and three of which are in process of construction

Goodyear Perfecting Special Airplane Tire

AKRON O—A low-pressure tire designed for exclusive use on aircraft is being perfected by the Goodyear Tire & Rubber Co The first public demonstration is to be given at the All-American Aircraft Show at Detroit in April, it is reported.

The tire uses very low air pressure—from 10 to 15 lb When a plane lands, the tire walls, being flexible, permit the tire to flatten out and cover a wide ground space This produces a cushioning effect and lessens the danger of slipping A J Musselman inventor of the Musselman coaster brake for bicycles, is developing the new tire

Sportsmen Order Travel Airs

WICHITA, KAN—The Frontier Club of America, an organization of sportsmen who plan to revive the days of the Old West, will purchase a fleet of Travel Air planes for use in transporting members from their homes in a big game reserve purchased near Springerville, Ariz.

Martine Orders Blackburn Craft

NEW YORK, N. Y.—Orders for six two-place Blackburn "Bluebird" Mark IV all-metal light seaplanes the first to be brought to the United States, have been placed with the Blackburn Airplane Co. of Leeds, England, through Lady Mary Heath for A. R. Martine of New York City. These planes will be equipped with Cirrus Mark III engines

Contrary to usual custom, these craft are made of steel plates riveted together, no welding being employed Norman Blackburn of the parent company will accompany the planes to America.

J-6 Gets Certificate 21

WASHINGTON, D C—Approved engine type certificate 21 has been awarded to the Wright Aeronautical Corp's New Whirlwind Nine, or J-6, which recently underwent official tests. It is designated as a nine cylinder radial air cooled engine developing 300 hp at 2000 r p.m.

Schools of California To Teach Aeronautics

SAN FRANCISCO, CALIF—Aeronautical courses in California high schools and colleges will be established under a program initiated by the California Development Association and approved by the State Department of Education First steps in the introduction of aeronautics in the public schools were taken when William John Cooper, Federal commissioner of education, recently approved the appointment of 10 recognized aviation leaders in California to constitute a state advisory committee of aeronautical education.

The committee will work out terminal courses in aeronautics, obtain technical assistance from the Army and Navy, and obtain the necessary equipment for the establishment of the courses.

B. M. W. Now Making Hornets

HARTFORD, CONN—Announcement is made by the Pratt & Whitney Aircraft Co. that the Bavarian Motor Works, Munich, Germany, is now in production on Hornet engines, rights for which were acquired last year Sixty of the Hornet plants were ordered from the Hartford company to meet the demand prior to full production in Germany Of these, 50 have been delivered in addition to approximately \$100 000 worth of spare parts and raw material

Yunker Concern to Wichita

WICHITA KAN—George C. Yunker, of Dodge City, Kan., is moving the Yunker Aircraft Corp. to Wichita for the purpose of manufacturing three place biplanes.

Many Airplanes Fly At Hoover Inaugural

WASHINGTON, D C.—Thirty planes, the Navy dirigible Los Angeles, and four non rigid airships flew in tribute to the newly-inaugurated President Hoover in an aerial parade here March 4 Brig. Gen. Benjamin D. Foulois, assistant chief of the Army Air Corps, led the group in a plane piloted by Maj. Carl Spatz of the "Question Mark"

Because of bad weather, this air gesture to the new Commander in Chief was short in duration Many more planes than these 30 were scheduled to join the group, but fog and rain prevented their flying in from Logan Field, Baltimore and Quantico a., where they had gathered. Nine Mitchel Field craft and a number of Keystone bombers had flown to the Baltimore base, while other bombers had congregated at the Virginia field

Being numbered among the Mitchel Field group, AVIATION's news editor failed to get a glimpse of the inauguration. He flew from Mitchel Field to Logan Field, accompanying Lieutenant Cone in one of the nine Curtiss Falcon observation planes—incidentally, No. 13 With the weather menacing, these planes later took the air to return to Long Island, but following a signal to break formation, only four flew on to make Mitchel Field that afternoon.

A great many commercial planes gathered at the fields in the vicinity of Washington to attend the inaugural Many of these were sent by manufacturers, while others carried visitors on scheduled flights to the Capital

With the weather fair on the morning of March 4, many of these crafts were to be seen over the city On March 5, the planes were exhibited to visitors who made their way to Bolling and other of the airports

Six Sikorsky Planes Ordered by Colonial

NEW YORK, N Y.—That orders have been placed for six Sikorsky "Amphibians" at a cost of more than \$350 000 is announced by Colonial Airways System this city

This order, in addition to previous ones for new planes totaling \$250 000, brings the total new passenger equipment of the system for Spring delivery to more than \$600 000 Other new planes ordered include three 14-passenger tri-engined Fords costing \$200 000 and two six-passenger Fairchilds to be used for mail and passenger service

Purchase of the new planes is in line with Colonial's announced policy of extensive development of passenger service over the lines this Spring and Summer

Curtiss Adds to Chain

NEW YORK N Y—Two more concerns have been added to the national chain of the Curtiss Flying Service, according to an announcement here. These are the Fairfax Airport Co, of Kansas City, Mo., and the Chesapeake Aircraft Co., Baltimore, Md.

Towed 200 Mi.

Dale Drake and his 190 lb glider which was toward by a Fokker to demonstrate the feasibility of an air "trailer."

Moth Announces 49 Planes Sold Recently

LOWELL, MASS—Announcement is made by the Moth Aircraft Corp, here that 49 Gipsy Moth planes were sold between January 1 and February 15 Seven have already been delivered as follows two in New Jersey, one in Massachusetts, one in Michigan, one in Ohio, and two in Florida.

Many distributors' territories have been closed and the Moth corporation has already received deposits on 1929 quotas for sales territories in Michigan, Ohio, New England and Southern Florida. Contracts for several large territories are pending and some desirable dealers' franchises are still available, according to Capt Archibald Johnston, sales manager

Propeller Company Moves

LOS ANGELES, CALIF—The California Propeller Co. recently has been moved to Redondo Beach, Calif., and production of wooden aircraft propellers is to be conducted on a large scale according to company officials The new plant has a floor space of 5 000 sq ft. with adequate room for future expansion. Development of a flying field and organization of a ground and flying school are reported under way J E Carroll is president of the company, Carl Fritzen vice president R. E. Coates, secretary, and Martin and Arthur Fritzen, directors.

Servair Wright Distributor

PITTSBURGH, PA.—Plans have been announced for the erection of a building for Servair, Inc, subsidiary of the Aircraft and Airways, Inc, of this city, which recently bought the Bettis Field for \$500,000 Servair is the distributor in Pennsylvania for the Wright Aeronautical Corp. products.

Pittsburgh Show Attracts Meeting

Pennsylvania Aircraft Operators Association to Convene March 14

PITTSBURGH, PA—Aiming to protect the rapidly-growing aviation industry from measures and restrictions which might hamper its progress, the Pennsylvania Aircraft Operators Association will meet in Pittsburgh, March 14 during the First Annual Pittsburgh Aircraft Show Several hundred commercial aircraft manufacturers, operators and pilots from every section of the State are expected to attend the meeting, which will be held in the William Penn Hotel

The association was formed in Philadelphia last November and a committee composed of Robert P Hewitt of Philadelphia, Herbert D Putnam of Pittsburgh, Jesse P Jones of Lancaster, Allen K. Owen of Reading, and William H Emery, Jr, of Bradford, was named to draw plans for the organization, and submit a list of prospective officers

The first official move of the Association will be to approve a plan to forward to authorities of the aeronautics branch of the State Department of Internal Affairs at Harrisburg, a petition asking the State to call a conference of the heads of aviation concerns and licensed commercial pilots throughout the State for the purpose of discussing the new State Aeronautical Act. The conference was suggested by Maj J Sydney Owens, commander of the 28th Division Air Service, P N G, who is also a member of the State Aeronautics Commission

Air Associates, Inc., Announce Expansion

NEW YORK, N. Y—Following a special meeting, Air Associates, Inc., this city, announce an imediate expansion program involving the expenditure of \$500 000 in plants and equipment, according to Haven B Page, treasurer of the firm This action was made possible by banking contracts in conjunction with the completion of Air Associates' board of directors, which includes 11 representatives of the executive staffs of prominent manufacturing, operating and financial organizations in the aviation field

The Corporation is now letting contracts for the construction of model service plants on the Chicago and Newark municipal airports, following the plan of its present field station at Curtiss Field, L. I. The service hangars will be equipped with complete machine shops, and airplane storage facilities Air Associates is one of the three advertised service dealers for the Wright Aeronautical Corp., engine manufacturer of Paterson, N J

Hoyt Group Gets Control of Moth

Interest Acquired by Exchange of Stock; Firm to Keep Original Name

NEW YORK, N. Y.—Acquisition of the controlling interest in the Moth Aircraft Corp by the large aviation group headed by Richard F Hoyt of Hayden, Stone and Co., was announced late last week by Earl L. House, former vice president of the airplane manufacturing concern at a dinner given for the representatives of the press in the Union League Club.

The Hoyt interests are said to be heavily interested in the Wright Keystone Travel Air, and Pan American companies Control of the Moth company was obtained principally by an exchange of its stock for that of the Travel Air company of Wichita, Kan., according to Mr House.

The Moth corporation, which holds the exclusive manufacturing and sales rights for the DeHavilland "Moth" light plane in the United States, its possessions and Cuba, will continue operations under its own name at the plant in Lowell Mass.

Firm History Outlined

In his talk Mr House outlined the development of the Moth corporation He said that in April, 1928, he visited the plant of DeHavilland Aircraft Co in England and secured the contract for the sale and manufacture of the Moth biplane As a result the Moth Aircraft Corp, was organized under the laws of the State of Delaware For organization purposes he became president, J. E. Morrow, who had been acting in the capacity of an engineer, became vice-president, and Kenneth R Unger, secretary and treasurer Approximately 50 per cent of the stock was issued and the work of securing a suitable factory for the manufacture of the plane was started

The war-time factory of the U.S Metal Ice Cartridge Co at Lowell Mass, was finally selected for the reason that it is adjacent to a flying field and because of the low labor costs in that vicinity There were three buildings, all of modern brick and steel construction which provided 100 000 sq. ft. of floor space. These buildings were admirably suited for the institution line production methods and were taken over by the Moth organization in November, 1928.

Prepare for Manufacture

In the meantime, however, the concern was re-capitalized This was in October Minton M Warren was elected president Mr. House, vice-president in charge of the New York offices, which were opened at 420 Lexington Ave., Frank M. Smith vice-president and general manager, and Wesley Heffner, treasurer Brodie G. Higley was retained as counsel Under the new officers, the work in preparation for the manufacture of the Moth in this country was begun

Realizing that a suitable engine for the plane was necessary, Wright Aeronautical Corp was interested in the DeHavilland "Gipsy," a four cylinder in line air cooled power plant developing from 80 to 90 hp As a result the Wright company secured a contract for the manufacture of these engines in the United States, similar to the one held by the Moth company for the manufacture of the planes The first of the American made engines will be ready in July.

To Exhibit at Detroit

The 1929 production schedule of the Moth corporation called for the building of 170 planes The first plane will be ready for exhibition at the aircraft show in Detroit, April 6-13 A second, equipped with seaplane floats, also may be ready In an effort to provide the dealers and distributors with planes for demonstration purposes before production could be started in this country, arrangements were made for the importation of 21 planes and 50 engines. The last shipment of these engines and planes it is expected will be receive in a short time and all will be licensed by the Department of Commerce on the basis of the British Air Ministry tests

To Weld Moth Joints

The Moths produced in the United States will be slightly different structurally from the British planes in order to conform with the requirements of the Department of Commerce For example the metal fuselages will be welded at all the joints and not bolted in part as in the case with the English product. Wing spars and ribs are being made slightly heavier also. The final drawings and stress analysis have been submitted to the Department and it is expected that they will be approved shortly Under the new ownership of the Moth company, production of the plane will be increased this year to at least 250 according to Mr House

With the exception of Mr. House who resigned his position to become the Moth distributor in the New York and New Jersey metropolitan area, the officers of the company remain the same. Following the acquisition of the controlling interest in the company by the new group though, the number of directors was reduced from seven to five

Wichita Export Firm Organized

WICHITA, KAN.—J. H. Turner and Walter Beech of the Travel Air Manufacturing Co. have formed an airplane export firm to promote the sale of Wichita-made planes in foreign countries. The Aero Export Co., capitalized at $50,000, will concentrate at present on Canada, South and Central America, Australia and the Orient. Later it is planned to expand and handle the export of American planes to all parts of the world.

Line of Biplanes Added by Parks

Five of New, Three-Passenger, Open Cockpit Craft Already Built

ST LOUIS MO—A line of open biplanes to supplement the cabin monoplane now manufactured by Parks Aircraft, Inc., is announced by Harry P Mammen, president and financial backer of the airplane enterprise The biplanes are to be known respectively as the Parks P-1 and P-2 and the monoplane is designated the Parks P-3

Plans for the biplanes have been developed by engineers retained more than a year ago in preparation for the opening of the factory at Parks Airport Five of the new planes have already been built Production of the planes will be in full stride in two weeks according to Mr Mammen Machinery developed for manufacture of the planes is already on its way to Parks Airport, to supplement the factory machinery already in use there.

The new biplanes have a seating capacity of three including the pilot The P-1 powered with an OX-5 has a high speed of 102 m p h and a landing speed of 34 m p h it is reported The P-2 powered with a 150 hp radial engine has a high speed of 120 m p. h. and landing speed of 38 m p h It will be sold with optional choice of power-plants, the buyer having the choice of the new 150 hp. Wright, the Axelson engine the Comet, or other air-cooled engines, it is announced

Heads G. L. A. C.

Col Benjamin F Castle, New York financier, who has been elected president of Great Lakes Aircraft Corp., Cleveland Mr Castle has a notable record in both Army and civil aviation. While with the Army he assisted in molding the policies of the air service

Details for Gliding Events Announced

DETROIT, MICH.—Details of the $3,000 cash prize gliding duration contest recently announced by the National Glider Association, and the program to be carried out at the National Glider Conference scheduled for Wednesday, April 10, during the All-American Aircraft Show, were announced here recently by Edward S Evans honorary president of the Association.

Under terms of the contest Mr Evans will award $2,000 to the first licensed American pilot completing a 10 hr flight in an American built glider, and an additional $100 for each hour of flight after the original 10 hr up to 20 hr If the pilot winning the contest owns his own machine he receives all of the money won, otherwise the prize money is to be divided equally between the pilot and owner of the craft

The National Glider Conference will be held at the Statler Hotel Mr Evans will open the meeting at 9 A M. with a speech on "The Objectives of the National Glider Association Other speakers include Maj Reed Landis, secretary of the Chicago Aero Commission, Dr Wolfang Klemperer of the Goodyear-Zeppelin Corp., and Prof Alexander Klemin.

Empire Contract Calls For 15 New Standards

SYRACUSE, N Y—The Empire Air Transport, Inc., recently organized to operate an air service and training school on a flying field adjacent to the Syracuse Municipal Airport has purchased 15 New Standard sesquiplanes according to announcement of the New Standard Aircraft Corp, Paterson N J The purchase represents an outlay of $126 000

The new service organization was incorporated recently with Emil Roth, Jr, Syracuse, as vice president and general manager The corporation plans to get under way about May 15 with complete service in all branches of flying, instruction, cross country transportation, short hops and aerial photography

A hangar, 100 by 120 ft in size with classrooms, machine shop shower baths and housing space will be erected Estimated cost of the hangar is $40,000

Aircraft Positions Open

WASHINGTON, D C—Civil Service examinations have been announced here for an aeronautical designer at a salary of from $2 600 to $3 100 a year and for an armorer expert at a salary of from $2 400 to $3,100 a year, at Wright Field, Dayton O, and for senior aircraft inspector at the Goodyear Zeppelin plant, Akron, O, at $8.72 a day Applications are receivable to March 31

Axelson Station for Wichita

WICHITA, KAN—Announcement is made here that this city is to get an Axelson engine service plant The Axelson Machine Co plans to turn out of 60 power plants a month by March 15

Aero Chamber Has New Office

NEW YORK, N Y—In line with its program of expansion authorized by the Board of Governors, the Aeronautical Chamber of Commerce has opened a Washington office, rooms 403-04 the Hill Building, Seventeenth and "I" Streets, N W, telephone, National 1115 The office is in charge of Paul H Brattain Members desiring special service in Washington for purposes of coordination should communicate with the Executive Offices of the Chamber in this city

Chose Sikorsky Plane For Long Trade Flight

NEW ORLEANS, LA—Plans have been recently concluded for a Sikorsky Amphibian bearing seven American industrial representatives, to tour 3 700 mi of Latin American territory and land in 50 of the leading trade centers of South and Central America promoting good will and trade according to Donald C Beatty, aviator and promoter of Birmingham, Ala., who is in New Orleans to enlist this city in the plan, which is known as the South American Trade Extension Flight

The plane will take off from the United States in the late Spring, according to Mr Beatty It will be routed to fly to Cuba thence down the eastern coast of South America, across Argentina north up the west coast, through Central America, and the lower part of the United States back to Birmingham Upon its return to the states the plane will make a tour of the various American cities subscribing to the flight.

Flamingo Shows Fast Climb in Test Flight

CINCINNATI, O—C Gilbert Peterson, sales director of the Metal Aircraft Corp, Lunken Airport, has issued a report on a recent altitude test flight of the Flamingo, all-metal monoplane built by the Cincinnati firm With a full capacity load, according to Mr Peterson the Flamingo climbed 5 000 ft in the first five minutes then attained an altitude of 16 000 ft.

Due to efficiency of the heating system and Balsa wood insulation the temperature was pronounced comfortable by passengers, who also commented on the efficiency with which the sound of the engine was deadened Chauncey D Young test pilot for the company, piloted the plane

The company is in full production in its recently-completed daylight factory, with orders booked, it is said, for its full 1929 production capacity

Wrights for American Eagle

KANSAS CITY, MO—Placing of an order for 200 Whirlwind engines is announced by the American Eagle Aircraft Corp., this city With a recent order for 300 Kinner power plants the firm's engine contracts total approximately $1,000 000, according to E. E. Porterfield, Jr, president The Whirlwinds will be used to power the New American Eagle A 329

New "Courier" Cabin Plane in Test Flights

LOS ANGELES, CALIF—Successful test flights have been conducted on the new Courier monoplane, a three place, Kinner powered, cabin plane Jack Rand flew the "Courier" from the Long Beach Municipal Airport and completed three loops on the first test flight. Later flights demonstrated excellent balance, stability, and maneuverability, the plane flying loaded, "hands off," for more than half an hour Further test flights are said to have established a high speed of more than 100 m.p h., cruising speed of 90 m.p.h and a landing speed of 30 m p.h In a climb test 16,800 ft was reached in 1 hr 20 min.

The plane was designed by William J. Waterhouse, it is said, and has a cabin entirely finished with thin sheet Micarta Production is to start soon at Long Beach in the factory formerly occupied by the International Aircraft Corp., although present plans call for the early erection of a complete new factory at one of the leading airports Officials said that a production of two planes per week is expected within the next 60 days

Officers of the Courier Monoplane Co., Inc., are L J Bailey, president M J Fix, vice president, E. DeFreitas secretary, and H S Plunkett, treasurer The concern is incorporated under the laws of California for a capitalization of $200,000

Seaboard Firm Gets Pinto Distributorsbip

NEW YORK, N Y—Seaboard Aircraft Corp. with offices at 225 Broadway and temporary hangar facilities at Curtiss Field L. I., has been appointed distributor for the Mohawk Aircraft Corp of Minneapolis with the exclusive sales franchise in the Metropolitan district, New Jersey, and Connecticut A Mohawk Pinto demonstrator is being flown at Curtiss Field

Personnel of the Seaboard Aircraft Corp includes Arthur K Ransom, general manager, Paul P Bartmer, in charge of maintenance, and Emil Burgin, chief pilot.

The Seaboard company has in turn named the Newark Air Instruction Corp. at Newark Airport, as dealer for Hudson, Essex, Union and Morris counties. The latter firm, headed by Capt. John O Donaldson, has placed an initial order for 10 Plutos, with two of the craft to be put into immediate use for instruction purposes

Orders 10 American Eagles

KANSAS CITY MO—A 10-plane order has been received by the American Eagle Aircraft Corp of this city from its Oklahoma distributor, the Graham Flying Service, Inc, of Oklahoma City, one plane to be delivered each week for 10 weeks. The Graham Flying Service is inaugurating a statewide survey in Oklahoma preparatory to a comprehensive sales campaign. The company, which is headed by B S Graham, an air service veteran of the war, is establishing schools in several large centers throughout its territory

Plan Production Of Barling N B 3

Nicholas-Beazley Company to Manufacture New Monoplane

MARSHALL, MO—Plans are now being made by the Nicholas Beazley Air plane Co., to produce the recently developed Barling NB3 monoplane which was designed for the concern by Walter H Barling and embodies several unusual features. This airplane, which has a metal structure, is a three place, open cockpit, low cantilever wing type powered with a LeBlond 60 engine and intended for training, passenger carrying and general uses.

In recent test flights the plane is said to have taken off in 3 sec. after a run of 60 ft. It attains a maximum speed of 110 m.p.h and has a cruising speed of 95 m.p.h. and a landing speed of 32 m.p.h. According to the performance figures furnished by the manufacturer the plane will climb to 1,200 ft in one minute and to 8,000 ft in eight minutes. The service ceiling is 18 000 ft, and the absolute ceiling 21,000 ft.

Has 700 Mi. Cruising Range

The Barling NB3 has a wing span of 32 ft 6 in, a length of 21 ft 6 in, and a height of 6 ft. 10 in. The weight of the plane empty is 676.5 lb. and the gross weight fully loaded is 1323.8 lb. The gasoline capacity is 25 gal and the oil capacity 3 gal 1 pt, giving a cruising range of 7 hr or approximately 700 mi.

The fabric covered wing structure is built up of one principal box spar to which duralumin plates and channel strips are riveted to form the leading and trailing edges. In the center of the spar eight duralumin plates placed in pairs constitute the four points of attachment to the fuselage. Nickle steel bolts are used at the attachment points and the entire wing can be removed in a very short time.

Special Airfoil Used

The wing is of constant chord and the tips are not tapered either in plan form or section. The root of the wing is flat and the tip sections, which are 5 ft., 6 in. in span, are inclined at a dihedral angle of 5 degs. Unusual stability is said to have been obtained by this arrangement. The wing tips are detachable from the root but are constructed in a similar manner except that the ailerons are attached in place of the trailing edge ribs. The dihedral is obtained by the thrust tube attachment at the point of contact of the main wing and the tips. A special high lift airfoil section, known as the Barling 90-A, is employed. Ailerons are differentially operated by push and pull control tubes.

The fuselage, which is well streamlined, is also fabric covered and the engine mounting, which is not interchangeable, is welded to the fuselage structure. Gasoline and oil are carried in a single two-compartment tank streamlined into the fuselage between the firewall and forward cockpit

Rudder and elevators are balanced and stabilizer and fin are adjustable on the ground. The rudder is hinged at three points, one on the fin and two on the fuselage.

A split type of landing gear, having a tread of 4 ft, 9 in and placed far forward is provided. Rubber shock cord is used to absorb landing loads. The wheels are 24 x 3 and streamlined with aluminum discs. The spring type tail skid is attached to the tail post of the fuselage. A right hand throttle and standard instrument equipment is furnished.

Five Command-Aires To Mississippi Firm

LITTLE ROCK, ARK.—The sale of five Command-Aire planes to the Pepper Electric Co. of Greenwood, Miss., and the signing of a contract to furnish 25 others to the W. I. L. Airschool, St Louis, Mo for delivery as soon as they can be manufactured, was announced recently by Maj J Carroll Cone, director of sales of Command-Aire, Inc, this city

One plane has already been delivered on the Airschool contract, and another, a Warner powered plane was flown to Greenwood recently for delivery to the Pepper Electric Co

Major Cone has gone on a 10 day trip through Texas and Oklahoma, flying a Siemens-Halske powered Command Aire with a view of signing up distributors for the company's products in that territory

Invents New Parachute

SAN ANTONIO, TEX.—A new type parachute which fits snugly to the back of the wearer has been invented here by Master Sergt Erwin H. Nichols of Brooks Field and recommendation for its adoption for use on Army bombers and transports has been made to Maj. Gen. James E. Fechet by a board which has studied the new device. The chute is so compact that the wearer is able to move easily about in a large plane, it is said. Sergeant Nichols is a veteran parachute instructor

Loening Names Distributors

The Loening Division of Keystone Aircraft Corp. has appointed the following distributors of Keystone-Loening Amphibians: East Coast Aircraft Sales Corp, Boston Mass; Cox & Stevens Aviation Corp, New York City, Ludington Philadelphia Flying Service, Inc, Philadelphia

1928 Accident Totals Listed by Department

WASHINGTON, D C.—For the year 1928, airplane accidents totalled 1,062, according to a recent report of the Department of Commerce. Of these, 368 resulted in fatalities and 322 in severe injuries. There was an increase in the second part of the year, with 390 accidents occurring during the first half of the year and 672 in the second half. The Aeronautics Branch reports however, that there was a correspondingly large increase in flying and in the number of licensed pilots during this latter period.

Of the four classifications of causes, Personnel, Material, Miscellaneous, and Undetermined and Doubtful, Personnel was the largest. The following is a list of the cause clasifications for 1928, giving first the percentage for the first half and second the percentage for the second half of the year

Personnel, Errors of pilots 43.29, 55.79, of other personnel 3 45, 2 18, total Personnel 46.74, 57 97. Material, Power plant failures 16 59, 15 74, structural failures 5 32, 4 47, handling qualities .44, .25, total Material 22 35, 20 46. Miscellaneous: Total 24 13, 12.12. Undetermined and Doubtful: Total 6 78, 9 45.

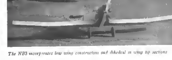
Prepare for Foreign Tour of Travel Airs

WICHITA, KAN.—Within a few weeks Pete Hill, president of the Travel Air Transportation Co., and Dyke Laudeman, veteran pilot for Travel Air Manufacturing Co., will leave Wichita for South American flight of Wichita planes. Six Travel Airs, probably all of the new cabin monoplane type, will be used on the sales tour

Two planes will be shipped to Cuba and sold after a demonstration tour. Then the pilots will take a steamer for Panama and Pick up two more planes. These also will be delivered after demonstrations. Then two more will be picked up in South America and sold after the purpose of the trip has been accomplished. An interpreter and several passengers are to be taken on the tour.

Mamer Buys Yellow Concern

SPOKANE, WASH.—Mamer Flying Service recently bought out the equipment and interests of the Yellow Air Lines of this city. The sale price was $40,000



The NB3 incorporates low wing construction and dihedral in wing tip sections

Personnel

R. M. Norris has been appointed manager of the New York terminal of the Washington New York airline operated by United States Air Transport, Inc.

V. A. Jackson, aviation chief engine mechanic with eight years experience in power plant overhauling in the Navy, has signed a contract with the Universal Aviation Corp. Mr Jackson, who has been stationed at the Great Lakes Naval Base, will have charge of overhauling work at Chicago.

Lieut Carl H Reynolds, U S N, in charge of the Navy's hydrographic office at Buffalo, has been named to the subcommittee of the airport advisory board that will choose a seaplane base at Buffalo

Harry N Atwood at Monson, Mass., has been retained as consulting engineer by a group which proposes to build multi-engined planes at the Rubwood Wheel Corp plant at Monson. The craft will be of Mr Atwood's design

William E. Barrett has been named publicity counsel of the Guardian Aircraft Corp., St. Louis, Mo.

Frederick W Peel has been appointed service manager in charge of engine overhaul and plane maintenance at the Air Associates firm field branches at the Chicago Municipal Airport, Curtiss Field, L. I., and, in the late Spring, at the Newark Metropolitan Airport. Mr. Peel has been with the Stout company.

A. J Angeli, formerly with the Mutual Aircraft Corp, has joined the staff of the Aeronautical Engineering Co., located near Oakland, Calif, airport. The concern specializes in the construction, maintenance and repair of aircraft.

Lieut J. M. Payton has joined the piloting staff of Canadian Colonial Airways, succeeding Frank J. Ambrose who has entered the Curtiss Flying Service

Col. Halsey Dunwoody, executive vice president of the Universal Aviation Corp, has been elected president of the Continental Air Lines, Inc. Joseph W Sabin has been elected vice president and assistant secretary in charge of operations and public relations. H L Kindred is vice president in charge of operations and C E. Stamps is assistant treasurer.

A M Robson assistant traffic manager of the Minneapolis office of Universal Aviation Schools, has been given charge of the business administration courses of the company, and left here March 1 to open a new business course at St Louis, where he will henceforth make his headquarters. Mr. Robson has been succeeded at Minneapolis by W. C. Nelson.

H C Lippiatt has been named general sales manager for the Travel Air Manufacturing Co., in the Pacific Coast territory. Mr Lippiatt has long been a prominent western aircraft dealer. He will retain the Travel Air agency for Los Angeles and vicinity

Col. R S. Hartz, commander of the Army's Around-the-Rim flight of 1919, has been appointed dean of the Western College of Aeronautics, Los Angeles. Colonel Hartz first entered the Western College of Aeronautics in October, 1928, as superintendent of instruction in the ground school course.

Emile Bergin has been appointed chief chief test pilot for the Acosta Aircraft Corp, recently organized under the leadership of Bert Acosta. The corporation will build amphibians, the first model of which will be known as "Armada A" and will carry four persons at a speed said to be around 130 m p h.

Hal Paul has been appointed manager of the St. Paul office of Universal Air Lines succeeding Floyd Hockridge, who was transferred to St. Louis

Robert Cantwell has been named chief pilot on the Halliburton line. Three other pilots definitely engaged are Tom Park of Tulsa, Frank Morton of Oklahoma City and Garza Wootan of Dallas

Clifford Henderson, director of Los Angeles airports, has been named instructor for a course of airport construction and management which is to start March 11 at the University of Southern California.

Trade Tips

It Is Reported That

—A survey of several tracts near Bartow, Fla., suitable for a city airport, is being made to determine the cost of a proposed municipal project.

—Mayor William F Broening of Baltimore has asked the State Legislature for an additional loan of $2,500 000 for the development of the Municipal Airport.

—An additional $7,000 has been appropriated by the Superior, Wis., city council for construction of a hangar, making a total fo $25 000 available for this building

—Islip, L I, Airport directors have voted to build a hangar as soon as weather permits. Charles L. Lawrance of the Wright Aeronautical Corp is president of the corporation.

Purchase of a plane and arrangements for hangar space are among the details which the New York Exchange Club flying group will consider at a forthcoming meeting

The Orin Welsh Aircraft Co is establishing an airplane factory and aviation school on a 140 acre field near Anderson, Ind

Aeronautical Calendar

March 9-16	First Annual Air Show of the Aero Club of Pittsburgh, Motor Square Garden, Pittsburgh
March 12	International Aeronautic Conference and Exhibition, Seville Spain.
March 23-30	Aviation Show of the Buffalo Chamber of Commerce, Buffalo Armory, Buffalo, N Y
April 6-13	Second Annual All-American Aircraft Show of the Detroit Board of Commerce Convention Hall, Detroit, Mich
May 4	National Elimination Balloon Race for the Litchfield Trophy, Pittsburgh, Pa.
May 27-June 2	Indianapolis Aviation Show of the Indianapolis Aircraft Association, State Fair Grounds.
May 28 30	Gardner Annual Trophy Race, St. Louis, Mo
June 16-27	International Aircraft Exhibition of the Society of British Aircraft Construction, Olympia, London.
Aug. 24-Sept. 2	National Air Races and Aeronautical Show, Cleveland, O
Sept. 6-7	Schneider Cup Race, over the Solent, Cowes, England
Sept 28	Gordon Bennett Balloon Trophy Race, St. Louis, Mo
Oct. 12-27	Southwestern Aircraft Exposition, State Fair Grounds, Dallas, Tex

BRIEFLY—

W. E. Boeing, of Seattle, Wash., chairman of the board of the United Aircraft & Transportation Co., announces the purchase of a 240 acre tract at Burbank, Calif., where an airport is to be established in which no runways will be shorter than 4,000 ft., and one will be about a mile long. This airport will be made the southern terminus of the Pacific Air Transportation.

New speed records for the San Francisco to Los Angeles route were set twice during one week recently by pilots of Western Air Express planes. On Feb. 25th Capt. Hal Holloway and assistant pilot Gilbert Clarke made the 365 mi. trip in 2 hr. and 5 min. at an average speed of 178 m.p.h. Two days later pilots George Rice and J. L. Bartlett covered the same ground in 1 hr. and 59 min. at an average speed of 183 m.p.h.

The new Moneta Airport, southwest of Los Angeles on Arlington Avenue, will be opened to the public during March according to the announcement of Jack Hall, and Ward Wheeler, in charge of developing the new commercial flying field.

The Glenn H. Curtiss Memorial Park has been proposed for Hammondsport, N. Y., to commemorate the early activities of the pioneer airman. The matter is before the Legislature.

What the Aeronautics Branch plans to do about the regulation of the flying schools will be divulged in a conference on the problem at the Detroit show in April.

The first of a fleet of 35 Knoll cabin biplanes has been ferried from Wichita, Kan., to Mexico City for the Inter-America de Transportaes Aereos.

Map signals are now sent by teletype from the Western Bureau over the Cleveland-Washington teletype circuit at 8.15 to 8.35, and 9.00 to 9.30 A. M. and P. M. These signals are utilized at the Weather Bureau offices at Hadley and Cleveland for making the weather map.

Andir, Inc., has begun the remodeling of a building opposite the Municipal Airport, Ontario, Cal., and the structure will be occupied within 60 days by the company as an airplane factory to have a capacity of a plane per week. W. H. Anderson is president of the concern.

The operating offices of the National Parks Airways, Inc., will be moved from Salt Lake City, Utah, to Butte, Mont., as soon as a hangar is completed there for its use.

Creation of an aviation commission for New York State is provided in a bill just passed by both houses of the legislature. An appropriation of $40,000 is included.

Roosevelt Field, Long Island, N. Y., has been sold to a syndicate headed by Seth Low, war flier and member of a New York brokerage concern.

Plans and contracts for the development of Floyd Bennett Field on Barren Island, Brooklyn, N. Y., have been approved by the New York Board of Estimate.

Plans of the Aeronautics Branch call for the addition of 3,900 mi. of lighted airways throughout the country in the year ending June 30, 1930. This is at the rate of $315 a mile.

To provide for its increasing personnel, the Richards Wilcox Manufacturing Co., Aurora, Ill., has added a large new building. Hangar doors are made and installed by this firm.

The first commercial plane turned out by the Great Lakes Aircraft Corp., Cleveland, was recently christened "Miss Great Lakes" and put through its paces by Charles W. Meyers, chief test pilot. The plane is a six passenger craft.

The Aeronautical Chamber of Commerce has announced it is asking for its members for information about the International Federation of Aeronautics, Mexico City, which is said to be promoting an aircraft show.

The offices and observation platform for the Weather Bureau have been completed at the St. Paul Municipal Airport.

A plan for combining the ground school of Air Service, Inc., with pilot training facilities offered by personnel of Northwest Airways has been announced.

American Eagle Aircraft Corp. has announced a 400 per cent. increase in its business since a year ago.

The United Aeronautical Society of Chicago has announced the leasing of the Chicago Coliseum for an aviation exposition which it plans to stage September 7-15.

Production on the Davis Monoplane, formerly known as the American Moth, has started at the Davis Aircraft Corp., Richmond, Ind.

Radium valued at $5 000 was recently shipped from Pal-Waukee Airport, Mt. Prospect, Ill., to Dwight, Ill., a Stearman plane, marking the Radium Service Corp.'s initial use of aircraft in transporting the radio active element.

The Springfield Chamber of Commerce has been negotiating with the Taylor Brother's Aircraft Corp. with a view of establishing a factory in Springfield, Mass.

An engine-silencing attachment, a recent invention acquired by the American Aeronautical Corp., will be used by that firm on its Savoia Marchetti planes to be manufactured on Long Island. The company's craft will be called "American Marchettis."

The Embry Riddle firm of Lunken Airport, Cincinnati, O., has acquired control of the Ravenrock Airport, Portsmouth, O., and its allied activities, including a flying school, through purchase of the Portsmouth Aero Corp. The transaction was completed through Ray Jones, Portsmouth, who will remain with the Portsmouth organization as general manager. The field is three miles west of Portsmouth on the Portsmouth Cincinnati highway.

Dissolved acetylene for welding and cutting is being supplied by the thirty-ninth plant of the Prest O Lite chain newly-established at 925 Hughes Street, Houston, Tex.

The Rankin System of Flying has been adopted by the Pikes Peak Flying School at Colorado Springs, Colo.

The Winstead Brothers Airport Co., which is located at Wichita, Kan., has launched an expansion program. The company, consisting of Carl and Guy Winstead, pioneers in the airplane report depot branch of the aviation industry, have capitalized their concern for $75,000.

New Firms Announced

SIERRA PACIFIC AIR TRANSIT has filed articles of incorporation in California, planning to operate passenger service between San Francisco, Fresno, Visalia, Los Angeles, and other points. The companies directors are: Frederick M. Hodge, J. F. Buckley, G. P. DuBois, L. L. Richard, and W. E. Wynne. Capitalization is put at $2,000,000.

AVIATION CORPORATION has filed a charter in Delaware calling for 10 000,000 shares of stock of one issue and of no par value. A full air transportation service is to be offered. Incorporators, all New Yorkers are Dorman T. Connett, Clarence E. Mahan, and Howard F. Mulloland.

NATIONAL AERO CORP. has been formed to manufacture and sell Cameron engines. The company of the same name formed some time ago is to be acquired, it is said, as well as the capital stock of Murray & Tregurtha, Inc., marine and aviation engine maker.

THE ADVANCED AIRCRAFT CORP. of New York City was incorporated last week with capital stock fo $50,000, to deal in aircraft. Francis Rogers of Richmood Hill, Joseph F. Soviero of Hollis and Mildred Way of Jamaica, are the directors.

PIONEER AIR LINES, INC., of Watertown, S. D., has been merged with the Rapid Air Lines, Inc., of Rapid City. Walter Halley, Rapid City, is president. W. O. Melham will continue as manager of the Watertown airport and George Ice, chief pilot.

GREAT WESTERN AIRLINES has been incorporated in Los Angeles, Calif., with a capital stock of $3 000 000, by George W. Loomis, John H. Moulder and Benjamin M. Moulder of Los Angeles, J. H. Wetmore of Lynwood and Addison T. Davies of Alhambra.

LORAIN AIRWAY SERVICE, INC., has been chartered in Lorain, O., by Leland M. Mills, R. W. Mills and others, and negotiations are now under way for the purchase of 130 acre tract on Leavitt Road to be used as an airport.

AIRPORTS AND AIRLINES

Aviation Allotted Radio Channels

Air Transport Gets 33 Exclusive Bands; 81 to Be Shared

WASHINGTON—Thirty-three exclusive channels and 81 to be used jointly with ship services have been reserved for aircraft radio under the international agreement on the allocation of the continental short waves ordered effective by the Department of State March 1. Many experts regard this as sufficient for the needs of aeronautics in all the countries of North America, since the wave lengths for the most part can be used jointly and simultaneously in all the continental nations.

Immediately after this non-diplomatic agreement was promulgated, the Federal Radio Commission issued a call to all applicants for aeronautical radio stations to meet at a conference in the Interior Building, Washington, March 11, "to coordinate the views of the various aviation operating companies, communication companies and others interested in perfecting and establishing means for communication between aircraft and ground stations and between ground stations along aviation routes."

To Consider Permits

At the same time, the Commission announced that it will consider pending applications for construction permits for the operation of radio transmitting stations in connection with aeronautical activites.

At the last meeting in the Carlton Hotel here the conferees went on record as favoring a program of "self determination," or of cooperative non profit making enterprise, in the establishment of supplementary radio services beyond those furnished along the routed airways by the Government. A technical subcommittee was given the task of investigating how best to use the short wave channels. This committee is headed by Thorp Hiscock, Boeing Air Transport Co., and has as its other members Herbert Hoover, Jr., Western Air Express, Paul Goldsborough, Universal Aviation Corp., H. C. Lenteritz, Pan American Airways; E. W. Proctor, National Air Transport, and H. J. Walls, Department of Commerce.

Frequencies Shared

The frequencies set aside under the North American agreement will not be used exclusively in any countries, for aircraft radio is placed in much the same class as maritime radio. The ground stations work idle bands of wave lengths, specifying certain ones that must be kept clear for emergency standbys. These are the bands the international agreement sets aside for exclusive use by aircraft services of all countries on the continent and for mutual use with ship services.

Air mobile services exclusively—1,600 to 1 648 kilocycles, 2,470 to 2,506 kilocycles, 2,602 to 2,650 kilocycles, 3,858 to 3,106 kilocycles.

Maritime and air mobile services—2,296 to 2,398 kilocycles, 2,650 to 2 746 kilocycles, 2,950 to 3,004 kilocycles, 3 412 to 3 500 kilocycles, 4,100 to 4,196 kilocycles, 4 745 to 4,795 kilocycles, 5,495 to 5,690 kilocycles.

Out of these bands, three channels are excluded for other purposes, namely, the frequencies of 1 604, 2 398 and 4,795 which are assigned to experimental services, probably aircraft. These are all for flying aircraft, that is, for ground to plane and plane to ground operation. Among the 228 channels set aside for general communication services the point to point channels must be found, if the aeronautic interests want to link their fields this way. All of the divisions between channels are based on a two-tenths of one per cent separation.

Alameda, Calif., to Vote On Proposed Airports

ALAMEDA, CALIF.—Local voters will be called upon this month to decide the question of re-zoning a tract owned by the University of California and now classified as an industrial section so that it may be leased to the San Francisco Airdrome, Inc. which would build an extensive airport on the site. City officials are against the referendum, wishing to protect the backers of the airport now in operation and which is due to revert to the city at the end of 50 yr.

The Airdrome company would spend about $500 000 in the development of the field, including an administration building and six hangars costing $40 000 each. The site is three minutes from Oakland, 10 minutes from Alameda and 20 minutes from San Francisco business sections.

T. A. T. Announces Schedule

NEW YORK, N. Y.—No definite date has been set for the inauguration of the T. A. T. air-rail service, according to the company's latest announcement. The present schedule planned is as follows: Leave Pennsylvania station, this city, at 6.05 P. M. arriving at the airport beside tracks at Cleveland at 7.55 A. M.; fly to Waynoka, Kan., with stops at Indianapolis, St. Louis (for lunch), Kansas City and Wichita, entrain for Clovis, N. M., and transfer to planes for Los Angeles the next morning or take a night plane at Waynoka direct to Los Angeles with one stop at Kingman. The night plane trip will not be inaugurated until after the service has been in operation a few months.

Cristobal-Chile Contract Given

Pan American Grace Airways Will Operate South American Line

WASHINGTON, D. C.—American air transport companies now are in a position to operate the longest air mail route in the world, with the award here recently of the contract for the Cristobal-Santiago, Chile, route to Pan American Grace Airways, Inc., of New York City. The winning bid was for $1.80 per mile and $.90 per lb. per 1,000 mi.

The airway thus arranged for serves directly the Atlantic seaboard to Montreal, Canada, Central America and the west coast of South America, and, through connecting systems, covers practically all of the United States. It is proposed to extend the service across the Andes to Argentina, when it is considered feasible.

The route runs from Cristobal, Canal Zone, via Buenaventura and Tumaco, Colombia, Esmeraldas and Guayaquil, Ecuador; Talara, Truxillo, Lima, Lomas and Mollendo, Peru; Arica, Iquique, Antofagasta, Caldera and Coquimbo, to Santiago, Chile and return, three times a week.

Start Arica-Santiago Service

Much of this new route has been started already. The Peruvian Airways, a subsidiary, is operating over 1,377 mi. between Guayaquil and Mollendo and a service between Arica and Santiago in Chile, covering about 900 mi., has been started also.

Pan American was not the low bidder, the American International Airways, Inc., having bid $1.44 a mile and $.72 a lb. Postmaster General New stated that the Pan American was considered to have the best facilities for promoting the proposed service. The concern's experience was taken into consideration, also.

The award was considered by Mr. New to be the msot important air mail contract yet made. It came as a climax to his period of service in the Post Office Department which has been marked by active promotion of the possibilities of air mail. During his tenure of office the service has grown into a healthy, thriving industry and an integral part in the economic system.

Plan Airport Convention

NEW YORK, N. Y.—Capt. Clarence M. Knox, vice president of the Aeronautical Chamber of Commerce in charge of the Airports Section, has announced plans for holding the first Airport Convention ever held in this country at Cleveland May 16, 17 and 18. All phases of airport operation, maintenance and construction will be represented in speeches and discussions.

Patrician Carries Many Passengers On Flight

WICHITA KAN—The Keystone Patrician largest American passenger liner, has reached this city completing the seventh leg on its flight across the continent and return The big plane has moved in slow stages from New York, stopping at Washington, Dayton, Cincinnati, Indianapolis, St Louis and Kansas City

More than 400 have flown in the Patrician since the tour began These include officers of the Army and Navy, prominent figures in the aviation industry and influential citizens More than 20 guest pilots, chiefly Army officers have taken the controls of the Patrician and flown her under test conditions

In actual flying time, the ship has averaged 115 m p.h. for the entire trip, and due to the easy stages in which the flight is being made she has rarely been called upon for even her normal cruising speed of 130 m p h It is said no repairs have been necessary up to this point Exhaustive economy data is being kept on the performance of the three Wright Cyclone engines and at the end of the 8,000 mi journey valuable information as to fuel consumption and operating costs will be available

Capt St. Clair Streett is chief pilot of the Patrician, and Kenneth G Fraser of the Keystone Aircraft Corp is in charge of the flight Representatives of the Wright Aeronautical Corp are aboard the plane

Pitcairn Revises Schedule

PHILADELPHIA, PA—Pitcairn Aviation flying the New York-Atlanta-Miami mail route has announced the following schedule effective March 1 which includes the new service to Daytona Beach Orlando and Tampa, Fla and Macon Ga

Southbound Read Down		Northbound Read Up
Lv 5 40 P M	New York	Ar 4 25 A M
[illegible]	Philadelphia	3 56 A M
11 45 P M	Washington	2 35 A M
1 52 A M	Richmond	1 26 A M
	Winston Salem	
2 39 A M	Greensboro High Point	11 21 P M
4 32 A M	Spartanburg	9 59 P M
5 45 A M	Atlanta	7 00 P M
7 45 A M	Macon	6 40 P M
10 00 A M	Jacksonville	4 25 P M
11 05 A M	Daytona Beach	3 15 P M
11 45 P M	Orlando	2 15 P M
Ar 12 30 P M	Tampa	1.25 P M
Ar 1 45 P M	Miami	Lv 12 30 P M

Eastern standard time is given for all cities except Atlanta, where the time indicated is central standard

Akron-Cleveland Line Planned

AKRON, O—A twelve passenger service between Canton, Akron and Cleveland will be opened April 15 by Air Services, Inc., a new company recently organized here The line will be closely affiliated with Stout Air Services Tentative schedule calls for two trips a day, using three cabin planes of a type not yet selected George W. Merz, president of the concern, has announced plans to take over a Ford tri-engine transport during the summer for passenger and sight-seeing service at Akron Municipal Airport It also will obtain four new planes for training purposes at a flying school to be operated at the airport

Boeing Gives January Report

SAN FRANCISCO, CALIF—Flying 258,439 mi over 3,565 mi of airway at an average speed of 99.7 m p h., 44 Boeing System planes carried 139 846 lb of air mail on the San Francisco Oakland Chicago and Seattle Los Angeles routes during January In addition to the mail, 130 passengers were flown 55 240 mi Only 8 per cent of all delays were caused by mechanical failures while 40 per cent were caused by adverse weather There were seven forced landings but no injuries On February 1, Boeing System had flown 4 385 106 mi transporting 1 647 451 lb of mail and 5 566 passengers

Pontiac Planning Tour And Meet to Open Port

PONTIAC MICH—Preliminary announcement of a civic air tour to visit every city in Michigan with landing facilities, starting June 10, and a competitive air meet at the close as the dedicatory program of the Pontiac Municipal Airport, has been made by the Pontiac City Commission

Invitations have been extended to every manufacturer of aircraft and equipment who distributes in Michigan to participate in the tour A pathfinding plane will be sent out early in the spring to determine the itinerary which is planned to include some 25 Michigan cities and cover approximately 1 200 mi

Cash prizes will be offered pilots who compete in the air meet which will climax the tour at the Pontiac airport Pilots from all parts of the country will be eligible. Conditions for participation in the tour and the meet will be announced soon. The First Pursuit Group and the Michigan National Guard Observation Squadron are expected to attend

Northwest Changes Schedule

MINNEAPOLIS, MINN—Changes in the flying schedule of the Northwest Airways, Inc, non-stop plane between Minneapolis and Chicago, together with a reduction in the fare were announced recently

Planes leave Minneapolis at 8 30 A M and St Paul at 8 45 A M arriving in Chicago at 12:10 P M The return trip departure has been set back a full hour to 3 P M allowing for better train connections in Chicago The plane arrives in St Paul at 6 30 P M and Minneapolis at 6 45 P M Fare on the route is now $35

Will Discuss Fire Protection

WASHINGTON, D C—A general conference on the third draft of proposed regulations covering airport construction and protection has been called by the Aeronautics Branch at the request of the National Board of Fire Underwriters for March 22 The meeting is open to all members of the industry interested in the problems involved and those unable to attend are invited to submit written discussions The session will open at 9.30 A M in the Department of Commerce conference room here

Intra-Canal Zone Air Traffic Limited to U.S.

WASHINGTON, D C—Only Americans may carry on intra-Canal Zone flying, according to a recent regulation of the State Department. The area has been designated as open to Americans and foreigners for trans-Isthmian traffic on equal terms and the new ruling has no effect on that, merely limiting the flying done solely within the zone to Americans whose planes must be available for Army use in case of war

Pending the development of commercial airports, land planes may use France Field and seaplanes may use Cristobal Harbor and Balboa Harbor Permission must be obtained from the State Department before any private air traffic may enter the Zone

All private aircraft entering or leaving the Canal Zone shall do so on one of the following routes From David via Santiago, Agua Dulce Manton, Chorrera by Darien, France Field or Cristobal Harbor, or by Balboa Harbor From Panama City via the National Highway to Albrook Field and thence along the main canal route Aircraft approaching airdromes on the Atlantic Coast will pass over a point about three miles directly north of the breakwater entrance, thence over the breakwater entrance direct to the designated landing area

Urge Another Omaha Field

OMAHA, NEB—Convinced that more than one landing field for airplanes will be needed at or near this city in the near future, W F Frazier Earl Russer and W. C. Woodring of Bellevue again are urging the purchase of a tract of at least 160 acres on the plateau at the south edge of Bellevue The same tract was advocated by the Boeing Air Transport more than a year ago. Since then the Boeing company has secured an indefinite permit to land at the Fort Crook field However it was stated that the Boeing company stands ready to build hangars and light the field once it is secured and put in condition.

Always a Boeing Plane in the Air

SAN FRANCISCO, CALIF—Two to six mail planes of the Boeing System are in the air continually, according to a chart shown by W. G. Herron, vice president in charge of traffic, Boeing Air Transport. From 7 P M to 12 P M, only two planes, east and westbound on the transcontinental are up From 7 A M to 10 A M, five planes are in the air—two east and westbound on the transcontinental, one westbound on the Chicago-Lincoln extension line, and two north and southbound on the Seattle-Los Angeles route of Pacific Air Transport. When a double section goes out on the transcontinental, as it frequently does, six planes are in the air during the morning period.

Fitted for Wisconsin's Snow

Ski-equipped planes are being flown regularly on the Northwest Airways Milwaukee-Green Bay mail run this winter One of the Stinson biplanes operated over the snow-covered trail is shown in the accompanying photo

National Parks Flying To Get Further Study

WASHINGTON, D C.—Further study of the considerations and interests involved in permitting airplane service to the National parks will be made prior to the issuance of regulations applicable to such airplane service, it developed at the conference held February 20 at the Department of the Interior Air transport companies railroads, and organizations of nature lovers were represented Most frequently brought up was the question of whether planes should be allowed to have landing fields inside or outside the park areas, although the right of a machine even to fly over a park area was disputed

Opposition to the establishment of landing fields within the park areas was voiced almost unanimously by the representatives of the railroads Carl Gray president of the Union Pacific, said that the roads had spent two and a half million in developing the parks and the lines leading to them Nearly a million more would be spent, he asserted That a landing field is a detriment to a park was contested by William P MacCracken Jr, assistant secretary of Commerce for Aeronautics

Opens Air Mail Bureau

PORTLAND, ORE—The Air Mail Information Bureau a downtown office at which all questions pertaining to air mail are answered, has been opened by Varney Air Lines, Pasco, Wash, Salt Lake City air mail contractor Hal E. Nourse, local Varney representative, is in charge of the office with Ben H Carter as his assistant

To Improve Bolling Field

WASHINGTON, D C.—An appropriation of $1 020 000 for the extension and development of Bolling Field is included in the bill for Army housing projects in various parts of the country signed by ex-President Coolidge just before he retired from office.

Plans Private Air Tour

PATERSON, N J—The New Standard Aircraft Corp is building a special model of its new plane for the use of Arthur von Briesen Menken in a flying tour of Europe northern Africa and Asia. Baggage compartments and tanks for fuel for 15 hr flying are being installed Menken, a former K L M pilot, plans to leave England in the Fall Eventually he plans to reach Japan and return to this country by boat. A Wright Whirlwind will be used Beside sightseeing, Menken plans to do some hunting

More Lights for Bad Stretch

NEW YORK, N Y—The bugaboo of the Boston-New York air mail pilots of the Colonial Airways System the 25 mi of wooded hilly country between Tolland Ct., and Dudley Mass, is to be partly removed by the installation of four additional beacons Further improvement of this section, which already has claimed the lives of two mail pilots is sought in a petition for an emergency landing field near Stafford Springs Conn

Radio Beacons Asked in South

NEW ORLEANS, LA.—This city has joined Houston and Beaumont, Tex., in a request to the Department of Commerce that radio beacons be established on the airway between here and Houston With the opening of the new line between Brownsville and Mexico City this route becomes one of the important units in the airway extending from Montreal to the Mexican capital

La Crosse Radio Beacon Ready

MILWAUKEE WIS—An air mail radio beacon to guide pilots will be in operation by March 15 at La Crosse, with Harold Bursop, Federal radio operator, in charge Others on the air mail service between Chicago and Twin Cities will be placed at Milwaukee Madison and St Paul, it is announced

Pan American Opens Mexico City Service

BROWNSVILLE TEX — The new link connecting this city with Mexico City and the entire eastern seaboard and Canada was due to be opened today, March 9 The southbound plane making the first flight out of this city in the new service was expected to have been piloted by Colonel Lindbergh, technical advisor to the Pan-American Airways parent company of the Mexican Aviation Co., operator of the new line

Planes on the regular schedule will leave this city at 7 30 A M daily and reach Mexico City at 12 45 P M The northbound plane will leave that city at 7 45 A M, arriving here at 1 15 P M Mail from New York and Washington over this line will reach the Mexican terminal soon after noon of the second day of travel, effecting considerable time saving over the present 10 day service. Ford tri engined planes will be used, providing passenger as well as mail transport

The inauguration of the line will include dedication of the new airport here. The program includes an extensive air pageant and competitive flying by both military and civilian planes

New Airports Planned

WASHINGTON, D C—The following municipalities have proposed the establishment of airports Holbrook, Ariz ; San Bernardino, Calif ; Madison Conn ; Darien, Ga , Chicago, Ill , Vandalia, Ill , Lohrville, Ia., Norway, Me , Grand Marais, Minn , St. Cloud, Minn ; Belton, Mont., Bridgeport, Neb., Malone, N Y , Lenoir, N C., Sandusky, O., Brownsville, Pa ; Pittsburgh, Pa , Nashville, Tenn., Trenton, Tenn., Dalhart, Tex., Galax, Va , Norfolk, Va , Clintonville, Wis

Airway Bulletins Ready

WASHINGTON, D C.—The following list of recently completed Airway Bulletins are now in the process of publication and are ready for distribution 533, Los Angeles, Calif ; 534, Milwaukee, Wis , 535, Amelia, Va., 536, Gaffney, S. C., 537, Waynesboro Pa , 538 Huron, S D , 539 Olympia, Wash , 540, Dayton, O , 541 Alma, Mich ; 542, Sioux City, Ia , 543, Sturgeon Bay, Wis., 544, Knoxville, Tenn

Von Hoffman Plans Barracks

ST LOUIS, MO—A hangar and barracks are to be built at the local municipal airport for the Von Hoffman Aircraft Co., the latter to accommodate flying students taking the company's courses. Thirty-six beds and library will be included The hangar 80 by 120 ft., will include a classroom, stockroom and offices

Asks Game Carrying Law

MADISON, WIS—Game may not be transported by airplane in Wisconsin under the terms of a bill introduced into the legislature here by Sen W H Markham, who explained that the clause is merely a precautionary measure

FOREIGN ACTIVITIES

Italia Inquiry Board Says Nobile at Fault

ROME, ITALY—Another chapter in the story of the ill-fated Italia has been closed by the report of the board of inquiry appointed by Premier Mussolini which places the blame for the disaster on a faulty maneuver on the part of Gen Umberto Nobile, the commander The same report clears Mariano and Zappi from criticism relative to their conduct as companions on the ice of Dr Finn Malgren who died under reported circumstances which aroused considerable censure throughout the world

Still another chapter is promised, however, in the announcement of plans for five Italian and five Norwegian explorers to penetrate the region between Northeastland and Franz Joseph Archipelago this summer in an attempt to locate the six men who were carried away on the free part of the dirigible There is considerable faith that the men landed safely and may possibly be alive. Funds are being raised.

Foreign News Briefs

Four R. A F Faery-Napier machines are on their way down the American continent on the annual Cairo-Cape Town service practice flight. They are due to arrive Thursday, March 14

The Karachi, India, Flying Club was opened last month and became the fourth, with the Bombay, Delhi and Calcutta clubs, to be conducted under the control of the Aero Club of India.

A night air mail service linking Malmo, Sweden, with Copenhagen, Amsterdam Paris and London is to be given a month's trial this summer it is reported

"It is quite understood between the Egyptian Government and ourselves that aviation should not take place over Egypt except by agreement between the two parties," was the way in which England's point of view in the recent tangle with Germany over the forthcoming flight of the Graf Zeppelin to that region was championed in the House of Commons

Bermuda and New York City will be the terminals in an airplane service to test the Armstrong seadrome The device, when completed, will be placed midway between the two terminals and a radio beacon will be established at Bermuda Considerable foreign interest has been displayed in the seadrome and its tests are awaited with much interest.

France is seeking to speed up its air transportation service by encouraging better co-operation between ground and air transport systems and by the development of night flying beacons and facilities The United States is pointed to as a model in this respect

Foreign capital is barred from Spanish air lines by decision of the government which is seeking to support aviation throughout the country Monopoly rights are granted only those concerns having Spanish capital exclusively and this policy has forced the Barcelona-Madrid service to buy out German investors

Build One Place Cabin Plane

PARIS, FRANCE—An interesting single seat cabin monoplane known as the Mauboussin P M 4 has been produced by Pierre Mauboussin and M L. Peyret It has a high wing of cantilever construction and, powered with an A B C (English) Scorpion engine, flew in tests at a maximum speed of 97 m p h., and cruising speed of 85 m p h., landing at 37 m.p h It weighs 408 lb. empty and has a disposable load of 254 lb. The span is 32 ft. 10 in and length over all but 14 ft 5 in. Ailerons extend along almost the full span of the wing

West Indies Draws Attention

LONDON, ENGLAND—Progress of American air transport interests in the West Indies has aroused English attention Sir Harry Brittain recently urged the necessity of action by the British government in developing air lines serving the Bahama Islands and other possessions before American companies get a foothold. The Carribean offers considerable ground for rivalry with American, German French, Mexican English and South American interests involved Pan American planes now fly to Nassau

De Havilland Produces Hawk-Moth Cabin Job

LONDON, ENGLAND—An interesting four place cabin monoplane known as the Hawk-Moth has been produced by the De Havilland concern The machine is similar in appearance to many of the American small cabin planes It is conspicuous for the absence of a wing center section, the wings being attached directly to the top longerons and the roof covering of the fuselage being transparent for visibility

The wings fold. The engine is a 200 hp D H Ghost, eight cylinder air cooled Vee type with a 2 to 1 reduction gear

Width (wings open)	44 ft.
Width (wings folded)	14 ft 6 in
Height	9 ft. 4 in
Weight (empty)	2,000 lb
Weight (loaded)	2950 lb

No performance data has been announced

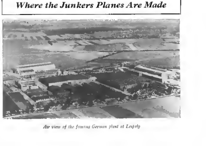
French Mail to Fly Atlantic

PARIS FRANCE—Plans of the Aero Postale Company to make its planeship mail line to South America an all-the-way-by-air system some time this Spring have been announced At present, fast despatch boats cover the water jump between the Cape Verde Islands and South America

Report Mail Contracts Signed

BUENOS AIRES, ARGENTINA—It has been reported here that a 10 yr. contract for the transportation of air mail between this city and New York City has been awarded by President Irigoyen to the Tri-Motor Safety Airways of New York A similar contract was reported to have been arranged to serve Rio de Janiero

Where the Junkers Planes Are Made



Air view of the famous German plant at Leipzig

THE BUYER'S LOG BOOK

Flottorp Propellers

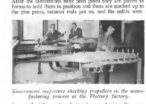
SEVERAL TYPES of wooden propellers for various engines are now being manufactured by the Flottorp Propeller Co., 1836 Linden Ave , S. E., Grand Rapids, Mich These propellers are efficient and durable and much care is exercised in their design and manufacture

Straight grained lumber, free from knots and other defects, is carefully kiln dried and tested both for moisture and other conditions After removal from the kiln the lumber is piled in a warehouse until ready for use The lumber is then planed on both sides, making it possible to detect any hidden defects

The pattern for each piece is laid on the lumber in such a way that all defects will be cut out and the grain will run straight when the laminations are assembled into a propeller block, at the same time getting as many cuts as possible Some of the laminations require hub wideners, which are glued on, marked and sawed The stock is then taken back to the planer, dressed to the desired thickness and is ready for another inspection

Sides to be glued are roughed by hand with a special tool or on a common machine scraper Before gluing, however it is necessary to be sure that the density is approximately the same for all pieces which are to be glued in one block The pieces are graded and matched and, if some boards are heavier on one end, they are used by alternating the heavy ends in building up the unit For this reason a number of propellers are glued at the same time This is important is obtaining the correct balance in the propeller

Temperature is carefully maintained in the glue room and the glue is spread with a large brush or glue spreader After the laminations have been glued they are placed in forms to hold them in position and these are stacked up in the glue press, retainer rods put on, and the entire number can be taken out and stored away, leaving the press empty for the next group



Government inspectors checking propellers in the manufacturing process at the Flottorp factory

After the blocks have been seasoned they are cut into shape, semi-automatic machines being used to remove most of the excess wood After this is done the propellers are sent to the ageing room, where moisture in the glued joints is dried out and equalized throughout the propeller If there is any strain between the laminations which would cause the unit to twist, this will occur during the ageing process before the final trimming and shaping is done by the handworkers During this process templates are used to obtain the correct thickness and curvature and protractors are employed to check the angle of the blades After this the propeller should be in balance, but on account of slight inaccuracies, it is nearly always necessary to go over it a few times before the balance will be perfect

The wood is next prepared to resist the elements by impregnation with triple boiled linseed oil and then using a good enamel The propellers are then tipped with metal and are ready for use.

Bronze Welding Rod

ANNOUNCEMENT HAS been made by the Oxweld Acetylene Co , 30 East 42d St , New York, N. Y , of a new bronze welding rod. This product, which is designated Oxweld No 21 High Strength Bronze Welding Rod, has been thoroughly tested in the laboratory and in the field

This rod is recommended for all bronze welding applications including the fusion welding of brass and bronze, bronze-welding of malleable and gray iron castings, joining dissimilar metals and building up bearings and other wearing surfaces Due to its composition it has a uniformly low melting point and easily controlled flow. It is said to produce a weld metal as hard and wear resistant as that formerly made with manganese-bronze rod

A photograph showing a bronze-welded six inch galvanized water line

By its use, tough and ductile weld metal having a tensile strength of over 45,000 lb per sq in can be produced This is about 15,000 lb per sq in in excess of the strength obtainable with earlier bronze welding rods In addition, it will make a much stronger bond with ferrous metals

Properties of this rod eliminate almost all boiling and fuming of the weld metal Annoying fumes are reduced to a minimum and elimination of oxide and gas inclusions is a reason for both the remarkably sound and strong weld metal produced and the good adhesion to iron and steel

Endicott Forgings

THE ENDICOTT Forging & Manufacturing Co , Inc, has for many years been engaged in the manufacture of aircraft forgings and among their customers are the leading aircraft manufacturers of this country

The company manufactures drop or upset forgings weighing from ⅛ lb to 80 lb to any S A E specification and have facilities for heat treating if desired This company has a capacity of over 20,000 tons per year

Bloxham Control Sticks

THE BLOXHAM "Safe-T-Stick" has been designed to make it possible for the instructor to disengage his student's controls in the event that the latter "freezes" on the stick This safety device is manufactured by the Bloxham Aero Supply Co, 3011 South Wabash Ave, Chicago, Ill

Diagrom showing the mechanism of the Bloxham Safe-T-Stick E—Extension piece for dual control stick socket, S—stick proper, H—clamp, O—bead, L—lips and J—jaw.

The mechanism of the Bloxham Safe-T-Stick is simple and the unit replaces the regular stick used in dual controls It is fastened in the socket in the student's cockpit by means of an extension piece The stick proper is placed in the hollow of a clamp and held in the proper annular position by a bead The clamp is made in halves hinged together on one side and having lips on the other sides Under normal conditions the lips are locked by jaws which can be released in cases of emergency by a wire which is led to the instructor's cockpit When the wire is pulled the clamp snaps open leaving the stick in the hands of the student but detached from the dual control mechanism

When it is desired to guard against accidental release of the stick, a lock pin can be inserted through two holes in the clamp making the releasing mechanism inoperative

Air Speed Indicator Tester

A NEW device which enables a pilot or air line operator to check air speed indicators quickly and accurately has been developed and introduced by the Consolidated Instrument Company of America, Inc. 305 East 47th St., New York, N Y. This instrument which is portable, is said to be the first of its kind to be developed and affords a means of checking air speed indicators after they have been installed in the instrument board of a plane

Portable Air Speed Indicator Tester.

The device is encased in a small wooden box and consists mainly of the dial which registers the air speed indication and a long length of rubber tubing, the end of which is attached to the instrument to be tested The tubing is passed through a pair of rollers on the inside of the box The Consolidated Instrument Company of America, Inc, also manufactures a complete line of instrument equipment for airplanes This includes instrument units of various types and sizes and instrument panels for a number of aircraft requirements

SIDE SLIPS

By Robert R. Osborn

According to the news, construction is about to start in a Delaware River shipyard, on a seadrome, which is apparently some sort of a floating island of a type which will be anchored at intervals along important water routes to permit the use of airplanes with land undercarriages If the inventor of this device is an enterprising salesman, we could put him in touch with at least six eastern flying fields which should be in the market for one of these floating landing areas right away

* * *

One New York man was so anxious to see the recent Sharkey-Stribling fight in Miami that he bought the airplane which took him down there It occurs to us that possibly he didn't realize he was buying the ship when he started out We can recall only too well buying at least three taxi-cabs under the impression we were hiring them

* * *

There seems to be quite a controversy raging in Philadelphia over the selection of a municipal airport In one news dispatch we read, "One objection that some people seem to be raising to this site for the airport is that half of the field is under water"

This, of course, is not the ideal condition for a Philadelphia field, but if work is started immediately it may be possible to have the entire field under water before the next National Air Race is held there

* * *

We don't know just how to account for it, but on overhearing some of the students' conversation at Curtiss Field on Long Island, we'd say quite an epidemic of military titles had struck camp None of the pilots were referred to with commissions less than Captain, and some of them even ranked as Majors and Colonels We didn't get an opportunity to consult General Winston, Field Manager, about the title prevailing in the rest of the organization, but will report them to Aviation readers as soon as possible

* * *

Mr K R K of Haverford, Pa, quotes from a news item in the Baltimore Sun, "Taylor swung the tail of the ship back and forth to slow it up while he looked for a landing place," and inquires how to go about getting a ship to wag its tail so effectively.

Contrary to what might be expected by any one having experience with dogs, a plane wags its tail most enthusiastically when it is kicked hardest

* * *

Messrs C C. D of Brevard, N C, and B C. of Brookneal, Va., both enthusiastically jump on the same news item, "Jack Story, 24, mail aviator of Kansas City, leaped 3,000 miles from his plane to safety, but didn't forget to shut off the motor and seize a sack of mail"

This seems to be the aeronautical equivalent of the old question, "What ten books would you take with you to a desert island?" Apparently every mail pilot should take a sack of mail with him on those long tiresome 3,000-mile parachute jumps, preferably a sack containing a large percentage of postcards.

* * *

That idea of shutting off the motor before making a parachute jump isn't such a bad idea, either, and we suggest that the Department of Commerce require every aviator to go right back and shut it off in case he forgets

The Eight-Hour Day for Ford Planes

Northwest Airways schedule their Ford planes for a round-trip flight between Chicago and Minneapolis-St. Paul every day. The trip each way takes about four hours. They assign their Ford planes a daily eight-hour duty.

Stout Air Services fly a plane from Detroit to Cleveland in the morning, use it for sightseeing during the day, and then fly it on the scheduled Cleveland-Detroit flight that evening. The plane from Cleveland does the same thing in Detroit. These planes are averaging close to eight hours daily—even more in the summer when daylight is longer.

This kind of performance, day in and day out, results from the all-metal construction of Ford planes. Every structural member is of *known* strength, and that strength is measured to meet a known stress. As a consequence continuous work does not bring uneven wear or produce chronic failures in parts of maximum wear. Every single part of the plane is able to do its full share of work every day.

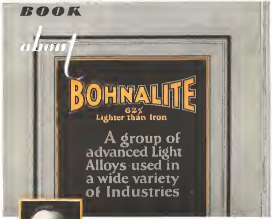
Only because they do obtain service free from disrupting troubles and adjustments, repairs and replacements, can owners of Ford planes deliberately schedule their planes for such a high average amount of flying. Knowing they can get that performance so certainly, they are able to operate with a minimum number of planes and keep the money they do invest in planes working at high efficiency.

Your planes are earning only when they're working. Nobody knows the limit of the Ford plane's capacity for work. *The first one has yet to wear out.*

The Stout Metal Airplane Company
Division of Ford Motor Company
Dearborn, Michigan

The Ford Tri-Motored All-Metal Transport will be on display at the All-American Aircraft Show

SEND RIGHT NOW FOR *YOUR* BOOK

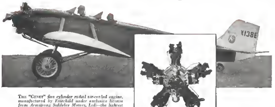


CHAS. B. BOHN
The authority who developed Bohnalite—the world's latest light alloy

This book illustrates and explains the wide range of aircraft parts that are now being made of Bohnalite. Here is explained the advantages of this new light metal—its physical properties and an informative history. If you are interested in weight reduction—longer life and an increased factor of safety—this book should be kept on hand for constant reference. Send for your copy today.

Aircraft Division
BOHN ALUMINUM & BRASS CORP., DETROIT, MICH.
New York Chicago Philadelphia Cleveland Pittsburgh

A NEW CEILING *in Training Plane Value*



THE "GENET" *five cylinder radial air-cooled engine, manufactured by Fairchild under exclusive license from Armstrong Siddeley Motors, Ltd—the lightest engine for its horsepower in the world and the most dependable, 80 h p at 2200 r p m., 84 h p at 2400 r p.m.—British rating Bore and stroke 4" x 4" Weight 215 lbs. Compression ratio 5.2 to 1, displacement 251 cu in Guaranteed specific fuel consumption is .55 lbs per horsepower hour. Guaranteed oil consumption .025 lbs. per horsepower hour*

The "21"

with its time-tested small engine of proven dependability and performance

YOU know and we know that a training plane has to be *good.* Any other idea is the most dangerous sort of false economy.

The Fairchild "21" is the *first* commercial plane in the history of American aviation designed at every point for the instruction of student flyers. The "Genet" engine, now being produced in volume by Fairchild at Farmingdale under exclusive license from Armstrong Siddeley, Motors, Ltd, answers for the *first* time the need for an American small airplane engine of *proven* dependability.

The Fairchild "21" is not merely good. It is at least a year ahead of the field at every point of comparison. Materials and workmanship are A plus—judged even by Fairchild standards. Safety factors have been actually doubled at crucial points. It is a low wing plane. "Floating" is eliminated and full vision is provided for both instructor and student Top speed is 105 miles per hour, and at its cruising speed of 90 miles per hour the "21" has a range of 425 miles. The landing wheels have *an eight foot spread*—30% of the wing span. Oleo shock absorbers eliminate bouncing. The plane can be ground looped at 40 miles per hour without scraping a wing tip.

If you, as a training school operator, are in business to stay and to make a profit, the "21" is the plane you want. At $4,250 flyaway Farmingdale—completely equipped and ready to fly—it will return more than a dollar's worth of service for every dollar you put into it.

P. S As is likely to happen when a good designer starts in to do a good job regardless, the Fairchild "21" looks its quality inside and outside. Over and above its use as a training plane, a lot of the more canny and air-wise sportsmen are going to want it for personal use.

Fairchild offers a dealer proposition which will command the immediate interest and respect of your banker—and which will enable you to sell planes at a profit Prompt deliveries in the flying season are assured to dealers who place their orders now. Write or telegraph Fairchild Airplane Manufacturing Corporation, Farmingdale, Long Island, N. Y.

F A I R C H I L D

AIRPLANES

ALLMETAL FLAMINGO

FOR GREATER OPERATING PROFIT

THE FLAMINGO ALLMETAL TRANSHIP

The Allmetal Flamingo Tranship offers to the operator, private owner and pilot all the flying qualities of the old types of construction, **plus the unequalled advantages of Allmetal construction —in the same price and performance range.**

The Flamingo Tranship a high-wing cabin monoplane, carries a pilot and 6-7 passengers 500 lbs mail or baggage with 150 gal fuel at 140 m p h with "Hornet" motor and 135 m p h with "Wasp" motor Economical cruising speed of 115-120 m p h Climbs 800-1200 ft per minute Wing span 50 ft Weight empty "Wasp" 2960 lbs., full load 5600 lbs. useful load 2640 lbs pay load 1455 lbs Wings and fuselage covered with duraluminum Allmetal throughout including metal wings and tail surfaces Seating arrangement optional with purchaser

Stockholders want profits, not alibis. Managers and owners with foresight will select the equipment that offers the greatest possibilities of earning flying profits. The Flamingo is outstanding in its ability to carry heavy loads at high speeds with minimum operating costs, and to attract patronage (especially in competitive fields).

The Allmetal construction decreases three heavy items of expense by effecting lower depreciation, lower insurance and lower maintenance costs The depreciation on the Allmetal Flamingo Tranship is only a nominal amount as the metal does not depreciate and the obsolescence factor is low due to the advance design.

The Flamingo with all these profit earning features is Allmetal throughout **but sells in the same price range as the old type of construction.**

Before being offered for sale to commercial operators the Flamingo has had a year's grueling service test

WRITE FOR PRICES

THE METAL AIRCRAFT CORPORATION OF CINCINNATI
LUNKEN AIRPORT

THE SPORT WACO

HERE is the pride of the makers of WACO . . . a remarkable airplane . . . fast, maneuverable, brilliant in its performance . . . yet withal a practical workaday aircraft

Speed! Speed to get there ahead of appointments Speed disdainful of wind and weather Speed which won such major air events of 1928 as the transcontinental derby John Livingston, the winner of that event, reports an *average* cruising speed of 129.4 mi per hr, for more than 10,000 miles of flying in his sport WACO.

Responsiveness! Instant response to the touch of a finger. Performance that tingles and thrills But performance marvelously combined with such pronounced inherent stability that the ship flies "hands off" much of the time And it settles to earth with the same easy precision as the straight-wing WACO, even though 7 to 8 miles faster in landing speed.

Dependability! The satisfaction of proved reliability Confidence in those "invisibles" which are the measure of real worth Zooming climb from take-off and short roll after contact of wheels to ground . . . characteristics that simplify emergency landings and make for *practical* commercial use.

Brilliant performance to thrill and satisfy . . . flawless workmanship to instill confidence and conquer emergencies . . . custom finish to express individuality . . .

You, too, will be proud to own a sport WACO.

SPECIFICATIONS and PRICE

WACO "Ten-T", 1929 model tapered wings, with "J-5" Wright, Whirlwind motor

$8525

Standard equipment includes:

Customer's choice of colors of wings fuselage and upholstery

Improved type cowling and wind shield for maximum protection to pilot and passengers.

Upholstered cockpit—luggage compartment.

Streamlined undercarriage — Bendix brakes—30 x 5 wheels

Metal propeller—hand starter—primer—compass—tachometer—air speed indicator—altimeter—oil pressure, oil temperature and gasoline gauges—navigation lights—fire extinguisher—emergency kit

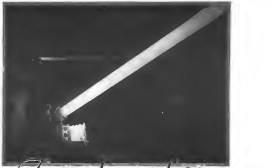
Dual controls

Faultless workmanship and rigid inspection—the "invisibles" that have made WACO'S reputation.

THE ADVANCE AIRCRAFT COMPANY, TROY, OHIO

WACO AIRPLANES

"ASK ANY PILOT"



For the Sake of Safety

SAFEGUARD the Pilots that visit your Port during adverse weather. Atmospheric conditions frequently exist that require the piercing power of a high intensity beacon, in order to reach the vision of the Pilot.

Increase the safety factor of night landings at your Port by installing a Sperry 30,000,000 candle power Auxiliary Beacon.

THE SPERRY GYROSCOPE COMPANY, INC.

BROOKLYN — NEW YORK

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UNIVERSAL SERVICE

The VOUGHT "CORSAIR"

MILITARY — SPORT — COMMUTING — TRAVEL

THE superior characteristics shown by the Vought "Corsair" in the U. S. Navy proves conclusively that this latest Vought plane is unexcelled, not only for military use, but also for private and commercial use where real performance, quality and durability are desired.

Vought Airplanes provide universal service over land or sea, being quickly convertible to land plane, seaplane or high performance amphibian

Each production "Corsair" is guaranteed to equal or exceed the Four World Records for Altitude and Speed officially credited to this airplane. And behind every "Corsair" is the Vought Organization, with its enviable record in aviation history from the first Vought plane, the VE-7 (1917), to the "Corsair" (1929).

CHANCE VOUGHT CORPORATION

Division of United Aircraft & Transport Corp.

LONG ISLAND CITY - - - - - NEW YORK

Aircraft

and accessory manufacturing and maintenance plants are using Oakite materials and methods with safety and economy for.

Cleaning motor parts after machining, before assembling, after dismantling

Removing heat treating oils
Cleaning alloy pistons

Cleaning aluminum crank cases and castings.

Removing stamping and cutting compounds

Anti-rusting parts

Cleaning radiators

Cleaning before plating, galvanizing, enameling, japanning

Cleaning fuselages, bodies
Stripping paint

Removing exhaust oils and carbon from bodies

Cleaning floors, walls and machinery

Washing waste and wiping cloths

Cleaning before lacquering, painting

Oakite Service Men cleaning specialists are located in the leading industrial centers of the U S and Canada

CLEANING

. . . . a vital factor in aircraft production and maintenance

IN aircraft manufacture and maintenance, cleaning operations are of major importance. For only when surfaces of metal parts are completely exposed can inspection detect hidden imperfections. And in overhaul work, only by rigidly excluding every bit of dirt, grit or foreign material from moving parts can disastrous mechanical failures be avoided.

Oakite materials and methods provide tested, successful procedures for performing every cleaning operation. They are backed by a trained service organization with twenty years' experience behind it, used by more than 19,000 concerns in over 300 industries.

And through Oakite Service Men you can, without obligation, obtain complete data for constructing and laying out efficient cleaning tanks, heating coils, and equipment. Detailed inquiries are invited.

Manufactured only by

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OAKITE

Industrial Cleaning Materials and Methods

A Vital Message to SCHOOLS

Cut Instruction Prices... *yet* *Double-up* on Profits!

You Can Do It With

The Monoprep

Especially Designed *for* Economical Training

MAINTENANCE and operating costs of the MONOPREP are but a mere fraction of the expense attached to the average training plane

That's why schools with Monopreps on the line can offer student training for less money and still enjoy larger profits than their competitors.

Often the same purchase money puts two *Monopreps* instead of a more expensive plane into service, which means two students in the air during the same hour. The side by side training permits the instructor to cover each lesson thoroughly *while the student is in the air.* This feature alone saves hours of time.

The MONOPREP embodies every qualification desired in a training plane.

Inquiries are invited for distributor and dealer franchise contracts. Write or wire today for full information.

MONO-AIRCRAFT, Inc.
Builders of the Monocoupe, Monocoach and Monoprep
Moline, Illinois, U. S. A.

Note these Monoprep Features—

Perfect vision all directions.
Oildraulic landing gear struts.
Two doors.
Friese type ailerons.
High lift wing.
Slow landing speed.
Gas consumption 4 gals. per hr.
Five hours fuel.
Flyaway price $2675.

Increased Enrollment Accrues to the School with the MONOPREP

THE Engines

Chocks are away! In the teeth of a gale
That whips through the stays with a trumpet's blare,
And up where the cloud-dimmed dawn is pale
The swift blades swish in a silver glare
Aloft and alone in a sky swept bare,
They flash through the sun's bright aureole
Off into space and a dim somewhere,
As the engines rumble and roar and roll

Let the earth slide down and the vision fail,
And the murky mists come unaware,
Let the wild winds whimper and whine and wail,
These are the things that the airmen dare
They ride with a confidence debonair,
Swiftly winging their lone patrol
What price weather? It's always fair
When the engines rumble and roar and roll

Then with nose shoved down and fabric frail
Shrieking and singing, they madly tear
Back from the skies with a fresh-won tale
Of conquest anew in the vast "up there,"
A man and a motor, valorous pair
Safely and surely they gain their goal
And so goes the story everywhere
When the engines rumble and roar and roll

L'ENVOI

Prince of the Heavens, wheresoe'er,
You ride your skies from Pole to Pole
A toast to his Majesty King of the Air
"To the engines that rumble and roar and roll"

—William Kimball Ziegfeld

ALONE—what boundless satisfaction to those who venture the air's uncharted ways is the knowledge that Continental Motors Corporation, the world's foremost authority on gasoline motors, as well as its largest producer, has perfected the development of a complete line of airplane engines . . . no longer alone is he who guides these ships of the air . . . together with a welcome brother . . . confidence . . . he rides the skies

Continental Airplane Engines will be exhibited at the All American Aircraft Show, Detroit, Michigan, April 6 to 14, 1929

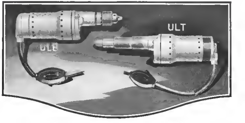
CONTINENTAL MOTORS CORPORATION
Offices Detroit, Mich., U. S. A. *Factories* Detroit and Muskegon
The Largest Exclusive Motor Manufacturer in the World

Continental Motors

Thor

ELECTRIC DRILLS *and* SCREW DRIVERS

MIDGET TYPE



Lower Your Costs With These Small Tools— Exceptionally Light In Weight and Speedy

These small electric drills and screw drivers were especially designed for delicate work. Since their introduction, they have rapidly taken the place of small hand operated tools because of their practicability and the many different kinds of work they can be used on.

They fit into the palm of the hand, and being light, are very easily handled. Ideal for Aeroplane manufacturers.

The drills are made in two sizes—3/16 and 1/4 in. capacity. Weight is 2¾ lbs. Length overall is 9¾ in.

The screw drivers are made in three types; one at 1250 R.P.M. for No. 8-32 metal screws; one at 950 R.P.M. for No. 10-32 metal screws; and one at 485 R.P.M. for No. 8 wood screws. The weight is 3 lbs. Length over all is 11¼ in.

You can try one of these small tools in your own shop for ten days, free of charge. Put it to the test. If its performance doesn't satisfy, return it at our expense. No red tape.

TOOLMAKERS SINCE 1893

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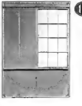

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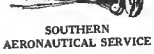

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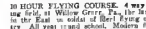

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TRANSPORT PILOT 1,000 hours, 25 types, desires New England position March until May, perhaps longer. Instruction, test and wide bad weather experience. Kindly state particulars and salary first letter. Box 1211, AVIATION.

EX ARMY PILOT with engineering education and eight years' executive experience desires connection with established aircraft manufacturing, airport or operating company. General knowledge of all branches of aeronautics. Experienced in production and management. Now assistant service manager for leading automobile corporation in New York City. Box 1214, AVIATION.

RESERVE OFFICER J. A. P. rating transport pilot, now flying, desires change. Available after April 15th. Experienced. Box 1216, AVIATION.

Classified Advertising

(Continued)

HELP WANTED

AIRPLANE LAYOUT draftsman. Only men with airplane experience need answer. Unqualified opportunities offered. Apply Berliner Joyce Aircraft Corp., 539 Hearst Tower Bldg., Baltimore, Md.

WANTED AERONAUTICAL engineer, thorough in aerodynamics and stress analysis. At least three years practical experience. State experience, age, salary expected. Box 1212, AVIATION.

WANTED AIRPLANE draftsmen with two or more years experience in large airplane factories. Apply Chief Engineer, Lockheed Aircraft Co., Box 1117, Burbank, Calif. 'Phone, Burbank 1681.

CAN USE trained airplane factory men in building our organization. Need good wing men, fuselage men, riggers and assembly men and experienced airplane sheet metal workers. Swift Aircraft Corp., Wichita, Kans.

MEN WANTED to look after our interests and secure members in profit sharing aviation school and development organization. Protected territory, liberal basis. No investment. Limited membership so act at once. Write Central Aeronautic Bureau, 178 West Adams St., Chicago, Ill.

EQUIPMENT WANTED

WANTED NEW and used OX 5 motors. J. Finkel, 76 Emerson Place, Brooklyn, N. Y.

WANTED THOMAS MORSE cowl for LeRhone motor, also War surplus aerial camera. Harry B. Rummell Co., Findlay, Ohio.

WANTED LICENSED late production, three place ship without motor. Quote lowest cash price. Brandt, Box 6, Wellington, Ohio.

WANTED OX 5 Travel Air Biplane in first-class shape. State condition and experience of ship and motor. Prices with and without motor. Prices cash and on payments. A. J. Heimmiller, 233 Crescent St., Peoria, Ill.

SPORT PLANE Assembled or not; must be cheap, with or without motor. Give description and lowest cash price. Box 336, Hornell, N. Y.

WANTED BEST ship $5,000.00 cash will buy. What have you? Cabin job preferred. A. S. 3086 Fulton St., Brooklyn, N. Y.

WANTED USED plane (licensed), suitable for student flying. $1,000.00 cash and monthly balance. Reply E. Joeckel, 226 So. Mountain Ave., Montclair, N. J.

WANTED USED amphibian, late type, good condition. Price must be low for cash. Box 1218, AVIATION.

WANTED 30 to 80 h.p., vertical air cooled engine, complete, in good condition. Must be cheap. Give weight and size. George Tissen, 2445 W Adams St., Chicago, Ill.

MISCELLANEOUS

BACKING FOR BOY 16 who would like to fly across the ocean. Box 1213, AVIATION.

COMPANY FORMED and acquiring capital to put a two million dollar aviation program in effect to manufacture aircraft motor and metal aircraft and resident flying school system. Now augmenting board of directors and desire to hear from responsible parties who would be interested in looking into the enterprise with view to becoming connected as directors or otherwise. State whether you would be interested in an investment in a properly financed and efficiently managed company. Lock Box 851, Syracuse, N. Y. Personnel Department.

DIESEL ENGINE manufacturing capital wanted by experienced manufacturing engineer. Entirely new proposition. Development work on high speed type antedates government experiments eliminating patent trouble. James M. Royal, M. E., 125 E. Park Blvd., Villa Park, Ill.

WILL TRADE a new 1929 model Nash straight eight, four passenger brougham with a large trunk on back, also six tires and fender wells for a new production plane. Waco, Travel Air or Swallow preferred. What have you? L. J. Perry Motorcycle Co., Kalamazoo, Mich.

WILL TRADE late model straight eight sedan in perfect condition with six tires and completely equipped otherwise, car cost $3,100.00 new, for three place biplane in good condition. C. H. Simms, Greenville, S. C.

T M SCOUT, two motors, one new, one used, $250.00 worth extras, all in A1 condition. Will trade for two-place job and pay difference. My price $600.00. Harvey Harwell, Hamlin, Texas.

Index to Advertisers

Number One of a Series of Fact-Statements Regarding a New Industrial Leader—Great Lakes Aircraft Corporation.

WILLIAM ROBERT WILSON —who as Chairman of the Board of Great Lakes Aircraft Corporation once more displays the remarkable talent for organization and accomplishment which has long since become a tradition in automotive and financial circles.

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IT IS a significant fact that shrewd commentators on aeronautical matters already list Great Lakes Aircraft Corporation among the leaders of the industry. That such a position should be conceded even in advance of forthcoming production announcements is a remarkable tribute to the inherent *responsibility* of the Great Lakes organization. The frank confidence which has been placed in this powerful newcomer is born largely of respect for the brilliant past records of its executives; the high expectations which it has raised throughout the industry are deep-rooted in the firm soil of a solid engineering and financial background. Aviation expects leadership from Great Lakes Aircraft Corporation because it is headed by men who have always been leaders—and because it is in business to stay.

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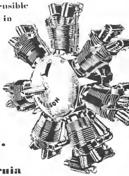

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